DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

FIVE DOLLARS PER YEAR

MARCH, 1955

FIFTY CENTS PER COPY

RUNS CLEAN ...USES LESS FUEL

YOU CAN say that again—the diesel that runs clean uses less fuel. That's why so many operators rely on one of the famous *Texaco Ursa Oil* series—the lubricating oils that are especially refined to make diesel, gas and dual-fuel engines deliver *more power* with *less fuel* over *longer periods* between overhauls.

Texaco Ursa Oils prevent harmful engine deposits, keep rings free for proper compression and combustion. Thus, you get the full power your engines were designed to deliver, use less fuel and keep your maintenance costs low. These are the benefits that account for the fact that—

For over 20 years, more stationary diesel h.p. in the U.S. has been lubricated with Texaco than with any other brand.

Let a Texaco Lubrication Engineer help you increase the efficiency and reduce the operating costs of your engines. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TUNE IN:
TEXACO STAR THEATER
starring
DONALD O'CONNOR
or JIMMY DURANTE
on TV Saturday nights.
METROPOLITAN OPERA
radio broadcasts
Saturday afternoons.

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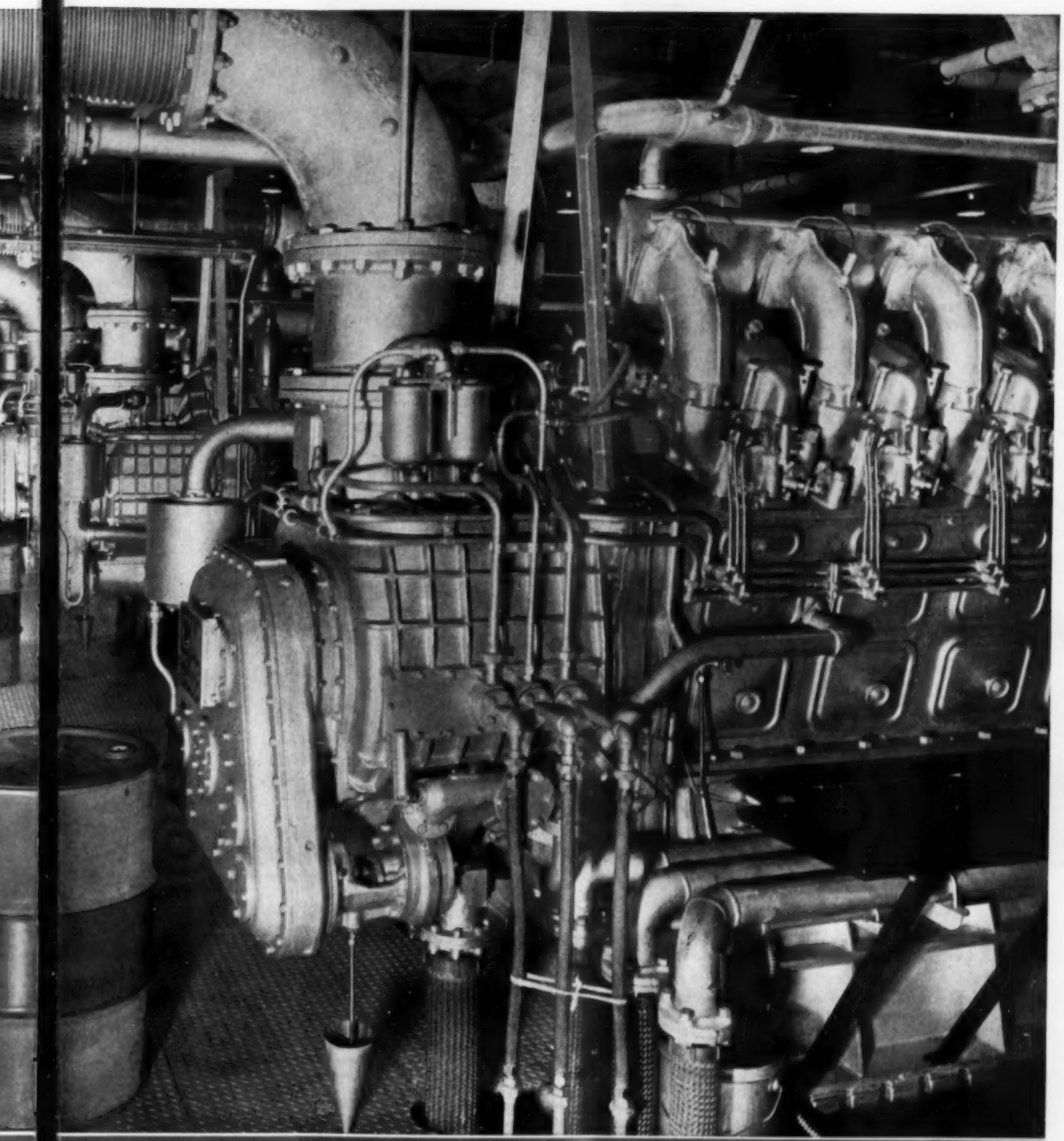
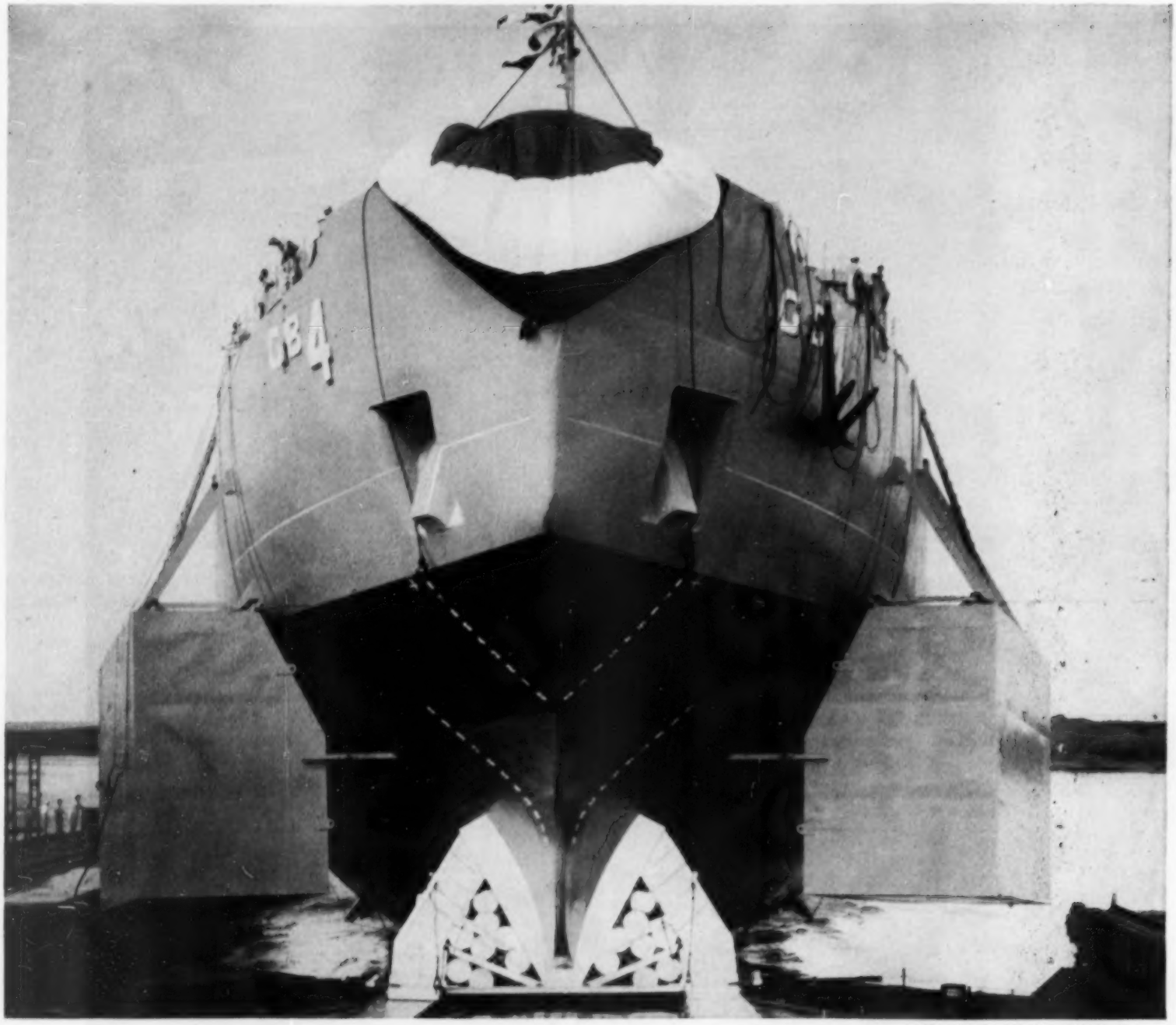
REG. T.M.



URSA OILS

FOR ALL DIESEL, GAS
AND DUAL-FUEL ENGINES



Official United States Navy photograph

Most powerful icebreaker joins the fleet

USS Glacier, the Navy's newest, most powerful icebreaker, slides down the ways to join the fleet that keeps the sea lanes open for defense and American shipping.

Wider than a cruiser, the *Glacier* is designed to ram and crack the ice prairies of the far north that are often more than 10 feet thick. Like all her sister ships, she is powered by Fairbanks-Morse Opposed-Piston Diesels.

Ten 2400 horsepower O-P's are used for main propulsion. Four 300 kw. O-P, and a 200 kw. O-P generating sets provide auxiliary service—a total of more than 24,000 Opposed-Piston horsepower.

In the icebreaker fleets of the U. S. Navy and Canadian Navy, the call for dependable power is a call for Opposed-Piston Diesels from 200 to 2400 horsepower. In your vessel, see the difference that reliability and economy can make. Ask your nearby Fairbanks-Morse Marine Diesel Specialist about repowering with O-P. Fairbanks, Morse & Co., 600 South Michigan Avenue, Chicago, Ill.

FAIRBANKS-MORSE

a name worth remembering when you want the best

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY • PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

DIESEL and GAS ENGINE PROGRESS

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IN INDUSTRY · IN TRANSPORTATION · ON THE SEA · IN THE AIR

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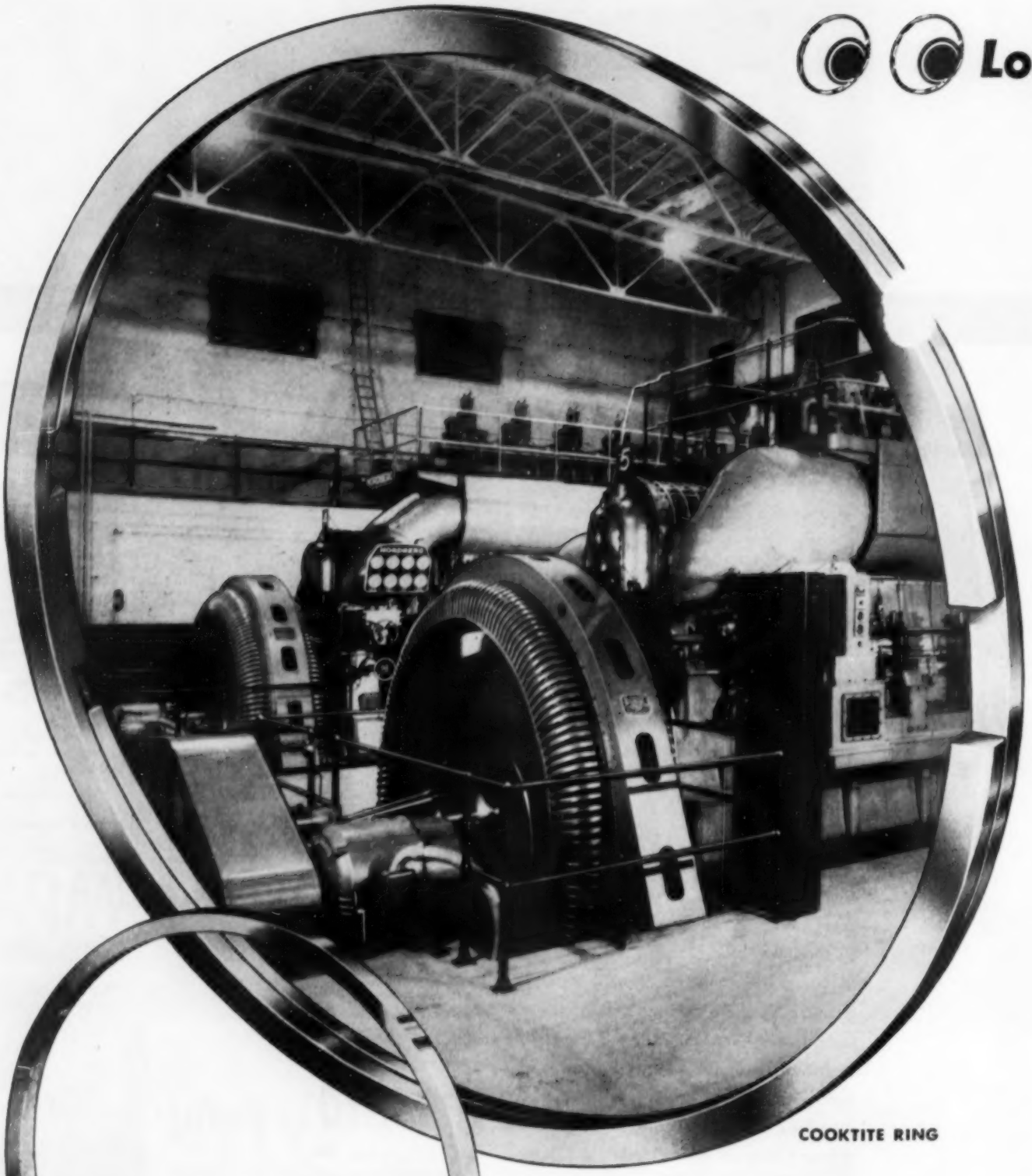
FRONT COVER ILLUSTRATION

As far as the eye can see . . . with diesel. Modern agricultural methods have been made possible by the economy and dependability of diesels. Here, a Caterpillar D4 tractor is pulling a 4-row iron age potato planter in the Cuyama District of California.

Look



COOKTITE RING

TYPE 101 RING

RE-TURNING MAKES BETTER RINGS!

Because they are re-turned as a final manufacturing process, Cook Piston Rings are light-tight, and conform perfectly to the cylinder wall. This eliminates the possibility of scuffing during initial operation. The perfect conformity of re-turned Cook Rings prevents hot gases from blowing by and impairing lubrication when it is needed most. The result — *longer life and — more efficient performance!*

to **COOK** *for* ***Better*** *Rings!*

372.2% More Operating Time Between Ring Renewals!

That's Bryan, Ohio's Experience With Cook Piston Rings!

THE 3600 HP Diesel engines on the opposite page are two of several large-bore units generating electricity for a municipal power plant — the Bryan Light & Water Works, Bryan, Ohio. Altogether there are four engines, totalling 9600 HP.

Before being equipped with Cook Plain and Cooktite Sealing Rings, these engines had been averaging only about 1750 operating hours between complete ring renewals. But look what happened under similar operating conditions, when Cook Piston Rings were installed. *Compare operating hours, cylinder wear and ring breakage — "before and after"!*

As you'd expect, this operator has now standardized on Cook Rings, exclusively, for all four engines!

If you're looking for a seal with the savings built in, mail the coupon today for product information, and the name of your nearest Cook representative.

	FORMER RINGS	COOK RINGS	% CHANGE
Average Operating Time Per Piston Pulling For Ring Inspection	1750 Hours	3500 Hours	+100.0%
Average Operating Time Between Complete Ring Renewals	1750 Hours	8265 Hours	+372.2%
Maximum Average Cylinder Wear Per 1000 Operating Hours	.0065"	.0031"	− 52.3%
Average Number of Broken Rings, Per Engine Set	9 Per 1750 Operating Hours	1½ Per 6500 Operating Hours	− 95.5%

C. LEE COOK COMPANY

Sealing Pressures Since 1888

C. Lee Cook Co.
958 South 8th Street
Louisville 3, Kentucky

Gentlemen: Please send me complete information on Cook Piston Rings and name of nearest representative.

Firm _____

Street _____

City _____ State _____

Attention _____

Type of Units _____

GM DIESEL
CASE HISTORY NO. 541-61

USER: Bert C. Altfillisch, Contractor, Los Angeles, California.

INSTALLATION: 12 General Motors Diesel engines powering 6 HD-19 and 2 HD-20 Allis-Chalmers tractors and two Twin-Engine Euclid scrapers on flood control project in Los Angeles County, California.

PERFORMANCE: Twin-engine "Eucs," with 4 wheels driving, scrape 23-yard loads. Two units do work of three single-engine rigs, and required no pusher on this job.

It Pays to STANDARDIZE on

available in more than 750 models of equipment built by over 150 manufacturers.

GM DIESEL POWER

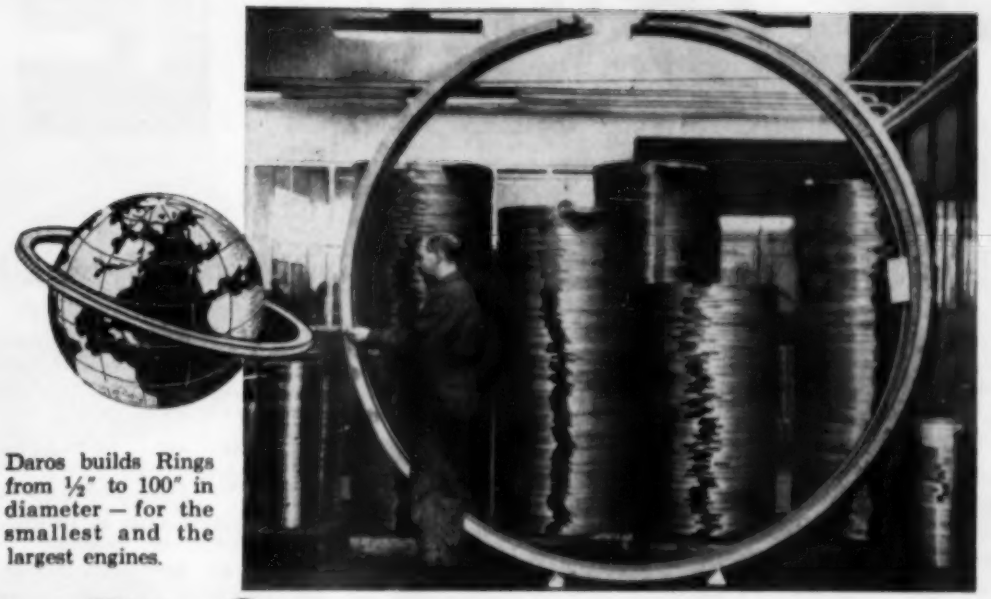
2 units do the work of 3

With two General Motors Diesel engines—one pulling and the other pushing—two 24-yard (heaped rating) twin-engine Euclid scrapers hauled as much yardage as three single-engine units did on this 1½-million-yard flood control project. What's more, the GM Diesel-powered "Eucs" scraped 40 tons in a single pass *without a pusher*.

Delivering power at every piston downstroke, quick-acting GM 2-cycle Diesels respond faster when the blade hits the dirt—accelerate quicker for faster runs to the spreading site. They start at the push of a button even in coldest weather—deliver thousands of hours of trouble-free operation. Clean, simple design makes maintenance easy and many moving parts can be interchanged between all Series 71 Models. When parts *are* needed, they're quickly available at low cost from your GM Diesel Distributor. For full details on GM Diesel power for your job, call him in today.

★ ★ ★

DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Engines....30 to 300 H.P. Multiple Units....Up to 893 H.P.



Daros builds Rings from ½" to 100" in diameter — for the smallest and the largest engines.

DAROS PISTON RINGS AROUND THE WORLD!

From Singapore to San Francisco; Cairo to Oslo; New York to Antofagasta; Istanbul to Buenos Aires; around the world and back again you'll find DaRoS Piston Rings in Marine Diesel Engines of all types and sizes. Think of it! More than 50% of all Motorships (above 1,000 tons) operating on the seven seas, use DaRoS Rings. These Motorships are powered with Engines made by 80 different Builders. Several hundred are double-acting, some as large as 20,000 h.p. each!

DaRoS has been supplying Swedish Iron Piston Rings to the Marine Industry for more than 60 years; back in the days of steam, before the first Diesel was developed. DaRoS was the world's first commercial manufacturer of piston rings.

The greatest demand for DaRoS rings is for use in Diesel engines. In Europe, many engine builders use DaRoS rings in original equipment. Throughout the world, many industries now depend on DaRoS rings for maximum operating efficiency and at a minimum cost. They find DaRoS rings stand up best, especially where corrosive fuels are a problem; stand up best under all operating conditions; even the most severe!

IMMEDIATE DELIVERY of DaRoS piston rings from Chicago for popular make industrial size Diesel engines.

(This is the second ad of a series designed to bring to Diesel Operators in the Western Hemisphere the important story about DaRoS Swedish Iron Rings—made by Ab. Davy Robertsons Maskinfabrik—Gothenburg, Sweden.)

REFERENCE BOOK NOW AVAILABLE—
WITHOUT COST OR OBLIGATION

Illustrating and describing the many types of DaRoS rings, each designed to meet a particular operating problem, and giving practical recommendations for selections. It answers many questions—such as: "Can DaRoS factory and the DaRoS American efficiently handle our requirements?"—"Why has Swedish Iron become world famous?"—"How does DaRoS foundry practice differ from that of other commercial piston ring manufacturers?"—and —"Why do DaRoS piston rings OUT-PERFORM and OUT-LAST ALL OTHER MAKES of piston rings?" Send for YOUR copy now.

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ELECTRIC POWER

DELCO-REMY ThunderVolt A.C. GENERATORS HEAVY-DUTY (180-Ampere Output Capacity)

Delco-Remy ThunderVolt A.C. generators are the hearts of 12-volt A.C.-D.C. electrical systems designed specifically for modern Diesel buses with fluorescent lighting and extra-heavy electrical loads.

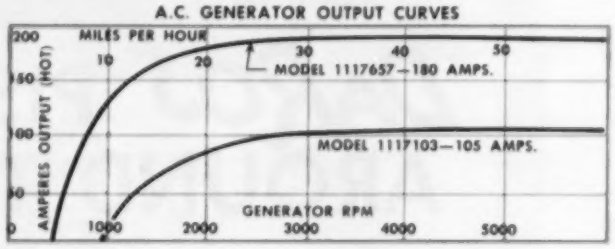
Desirable performance characteristics include cut-in at low generator rpm . . . maximum output of 180 amperes at approximately 2000 rpm. The new generators supply not only alternating current for fluorescent lights but also ample direct current for the heaviest electrical loads coupled with lengthy engine-at-idle periods.

Impressive features of the new generators are their light weight, very high output capacity, and ability to operate over a wide speed range with greatest efficiency. Specify Delco-Remy electrical equipment on your new buses.

A.C. GENERATOR PERFORMANCE DATA

Model	Volts	Cut-In RPM*	Curb Idle Amperes*	Maximum Amperes	Power Watts	Recommended For
1117103	12	975	6	105	1260	All speeds.
1117657	12	625	100	180	2160	All speeds.
1117062-3-4	6	750	30-40	90	540	All speeds.
*APPROXIMATE (BASED ON 100 GENERATOR RPM/MPH)						

A.C. GENERATOR OUTPUT CURVES



DELCO-REMY ThunderVolt D.C. SPLIT-FIELD GENERATOR HEAVY-DUTY (120-Ampere Output Capacity)

The Delco-Remy 12-volt split-field generator and its companion regulator are rugged and dependable—designed to meet the needs of Diesel transit buses having increased electrical loads coupled with a high percentage of engine idling time.

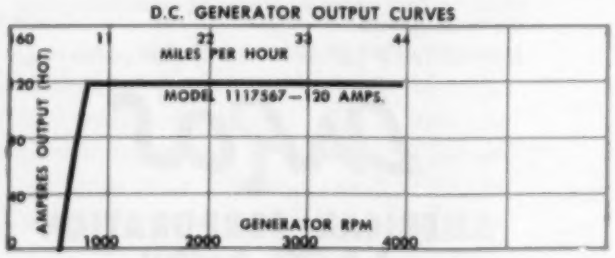
Desirable performance characteristics include low cut-in, high output at engine idle, and quick attainment of maximum output. Note performance table at right.

Operating benefits include reduced battery cycling, long battery life, and a simplified electrical system with sustained voltage—at no sacrifice in ruggedness or dependability.

D.C. GENERATOR PERFORMANCE DATA

Model	Volts	Cut-In RPM*	Curb Idle Amperes*	Maximum Amperes	Power Watts	Recommended For
1117567	12	550	70	120	1440	Low speed & idling.
*APPROXIMATE (BASED ON 100 GENERATOR RPM/MPH)						

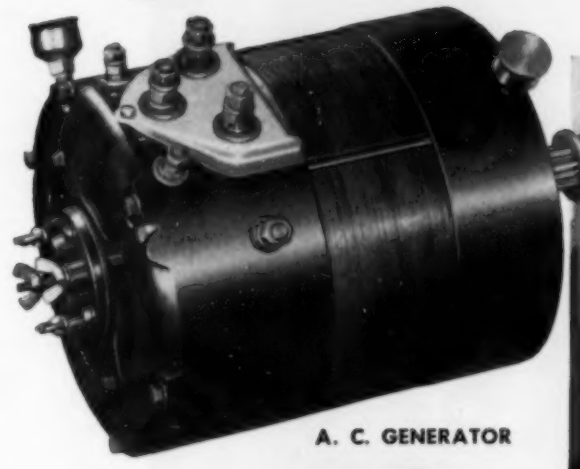
D.C. GENERATOR OUTPUT CURVES



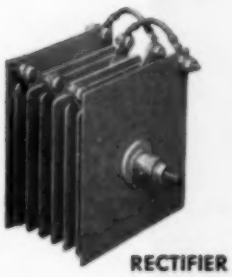
Delco-Remy
ThunderVolt
ELECTRICAL SYSTEMS

DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

right for the job



A. C. GENERATOR



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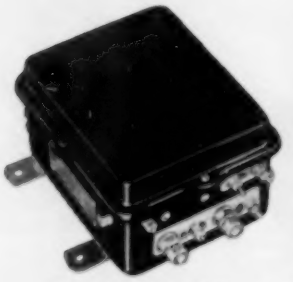
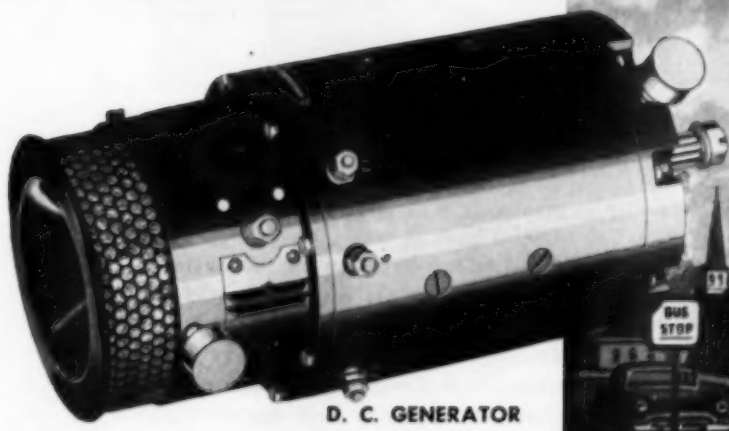
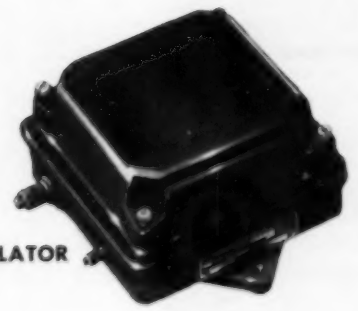


REGULATOR



D. C. GENERATOR



REGULATOR

W H E R E V E R W H E E L S T U R N O R P R O P E L L E R S S P I N

Portrait by Fabian Bachrach

Bell Aircraft has 13,000 payroll savers

"From every point of view, the purchase of U. S. Savings Bonds contributes to the soundness of our economy and to the individual security of our citizens. I am proud that at Bell Aircraft our employees are helping to strengthen the national economy and their own future security through the Payroll Savings Plan.

"In a recent campaign Bell employees achieved a record of nearly 99% participation in the Payroll Savings Plan, bringing to 13,000 the total number of our employees who are saving systematically through the regular purchase of Savings Bonds."

LARRY BELL, *President Bell Aircraft Corporation*

If your company does not have the Payroll Savings Plan, or if you have the Plan and employee participation is less than 50%—get in touch with Savings Bond Division, U. S. Treasury Department, Washington, D. C. Your State Director, U. S. Treasury Department, will be glad to help you install a plan or show you how easy it is to build employee participation in your present plan.

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Robert H. Hadrcan

Editor—DIESEL PROGRESS

The Engineer's Report

CASE HISTORY

LUBRICANT RPM Delo Oils

FIRM Greyhound

Greyhound's new Scenicruisers use RPM DELO Oils!

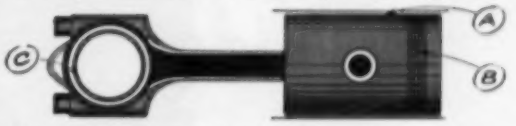
$49,000 WORTH OF HIGHWAY LUXURY—that's Greyhound's new Scenicruiser. Five hundred of these 43-passenger luxury coaches are going into service on through routes. These twin diesel power units, as well as other Greyhound buses in the West, use RPM DELO Oils—chosen by Greyhound because of its years of outstanding performance with these quality oils. Power from the two side-by-side 150 h.p. diesels for each coach goes through two fluid couplings and a multi-speed transmission to the forward axle of the tandem rear unit; rear axle rides free. Each coach has captive air suspension, power brakes, power steering and air conditioning, and will operate on either engine.

FOR MORE INFORMATION about petroleum products of any kind or the name of your distributor, write or call any of the companies listed below.

RPM DELO LUBRICATING OILS

TRADEMARK "RPM DELO" REG. U. S. PAT. OFF.

How RPM DELO Oils reduce corrosion, wear, oxidation in all heavy-duty engines



A. Contain special additives that provide metal-adhesion qualities...protect parts whether hot or cold, running or idle.

B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring sticking. Detergent keeps parts clean...helps prevent piston scuffing.

C. Special compounds stop corrosion of any bearing metal and foaming in crankcase.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado

Atlantic Coast Line
lubricated with

speed perishable products

Diesels
Gulf Dieselmotive Oil

non-stop to markets

Atlantic Coast Line freights whisk all kinds of perishable vegetables from Florida to Northern markets on a non-stop schedule. Every precaution is taken to insure rapid delivery of these important perishables.

To insure dependable and economical operation, Gulf Dieselmotive Oil was selected to lubricate the powerful Diesel locomotives that roll these important freights through on exacting schedules.

Many other Diesel units on crack trains throughout the United States use this modern Diesel lubricant that contributes to better performance, greater availability, and lower maintenance costs.

Here's why:

1. Effective detergent action prevents harmful piston ring belt deposits.
2. Base stocks are selected for their ability to help prevent hard deposits on the piston crown and in the ring belt area.
3. 100% solvent refining (removing undesirable constituents) insures greater stability and better bearing protection.

Gulf Sales Engineers, experienced in railroad Diesel operation, are always available to aid you in maintaining high standards of lubrication throughout your system. Write, wire, or phone your nearest Gulf office today for this expert lubrication assistance.

Gulf Oil Corporation • Gulf Refining Company
1822 GULF BUILDING, PITTSBURGH 30, PA.

THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

Power with INTERNATIONAL to Cut Production Costs

SURE THING FOR SHOVELS. The INTERNATIONAL 75 horsepower UD-350 diesel engine that powers this Koehring No. 205 shovel is one of 18 IH engines that keep production high, maintenance low on everything from the big dippers to rock crushers, from motor graders to generators.

Specify an INTERNATIONAL engine—first choice of more than 200 leading equipment manufacturers

INTERNATIONALS are first choice of more than 200 leading equipment manufacturers because:

1. They power machines at peak efficiency for years and for minimum maintenance and operating cost—features of IH heavy-duty engines for more than 50 years.
2. They have unsurpassed parts and industrial application service support in the field—from INTERNATIONAL Industrial Power Distributors backed up by IH Parts Depots and IH field service engineering—features that mean maximum production for the long life of the engine.

So it will pay you to specify IH engines as original equipment and replace with IH, when it's time to repower. Get the full facts on how you can cut operating costs on your equipment by putting in an INTERNATIONAL. There are 18 diesel and carbureted engines in the IH line that ranges from 16.5 to 214 horsepower at useable speed—each a pay-off power plant in its own class.

INTERNATIONAL HARVESTER COMPANY,
CHICAGO 1, ILLINOIS

INTERNATIONAL
INDUSTRIAL POWER
MAKES EVERY LOAD A PAYLOAD

DEAD END FOR DUST!

Multi-Duty Filters clean intake air for six 2000 H.P. Worthington gas engines for Texas Illinois Natural Gas Pipeline Co., New Caney, Tex. Note use of AAF intake deflectors which assure maximum weather protection and serve to reduce shock waves emanating from air intake.

AAF MULTI-DUTY FILTERS ASSURE CLEAN INTAKE AIR AUTOMATICALLY

THERE'S a big investment tied up in these six 2000 H.P. gas engines that can quickly be torn down by dust. That's why the matter of filter selection was of prime importance—and resulted in the selection of AAF Multi-Duty Self-Cleaning Filters.

"Variables" have no place in the cleaning of intake air. Uniform air delivery, constant efficiency, low operating resistance and infrequent maintenance are "musts" for true dust protection. Multi-Duty measures up on every count because this filter keeps itself "fit" through continuous self-cleaning action.

Write For New "TELL ALL" Catalog

This 16-page, illustrated catalog presents the detailed story of Multi-Duty design and performance. Shows you how filter is adapted for indoor or outdoor installation—for smooth or pulsating air flow application. Capacities, dimensions, weights, installation instructions — all are incorporated to give you a clear-cut picture of how Multi-Duty solves air cleaning problems easily, effectively and economicaliy.

Write for your *free* copy today. Ask for Catalog 150-B.

AAF herman nelson

American Air Filter
COMPANY, INC.

American Air Filter of Canada, Ltd., Montreal, P. Q. • 408 Central Avenue, Louisville 8, Kentucky

Walnut cracks tough problem in lubrication

—chooses STANDARD HD OIL

William G. Eslick, Plant Superintendent, goes over lubrication and overhaul records with Standard Oil lubrication specialist Albert J. Thomas. Working with customers to help crack tough lubrication problems is Al Thomas' business. Al has the training and experience for such jobs. A graduate of Iowa State College with a B.S. in Mechanical Engineering, Al joined Standard Oil in 1950. After completing Standard's Sales Engineering School, he began working with industrial accounts on their lubrication problems. Customers of Al's find his experience and training pay off *for them*.

THERE WAS LUBRICATION TROUBLE in the power plant at Walnut, Iowa. The three diesel engines in the plant were experiencing stuck rings, excessive crankcase deposits and hard carbon deposits. Engines were sluggish and would not produce full power.

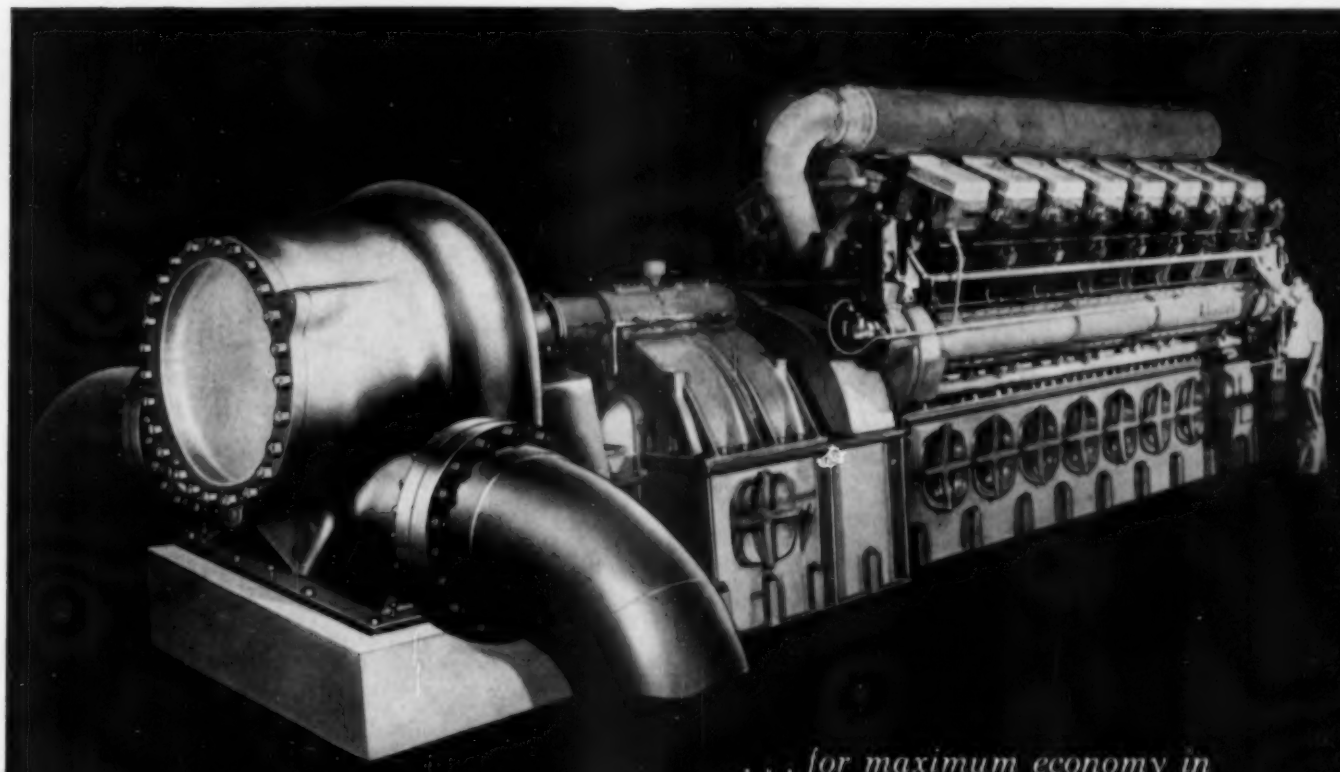
William G. Eslick, Plant Superintendent, working with Standard lubrication specialist, A. J. Thomas, decided on a course of action: he switched the engines to STANDARD HD Oil. Now, after more than 26,000 hours of operation, engines are clean. Ring sticking is eliminated, wear reduced to a minimum. Carbon deposits are reduced and remaining carbon is easily scavenged because it is now soft and flaky, not hard as before.

The initial fills of STANDARD HD Oil—plus make-up—are still in the engines. The community of Walnut, Iowa, is getting first rate electric service. Its power plant's lubrication problems have been licked. STANDARD HD Oil has again demonstrated its superior lubricating characteristics.

Perhaps you would like to know more about STANDARD HD Oil. In the Midwest a call to your nearby Standard Oil lubrication specialist will bring a prompt response. Or contact, Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (Indiana)

STANDARD



. . . for maximum economy in Gas Pipe Line service . . .

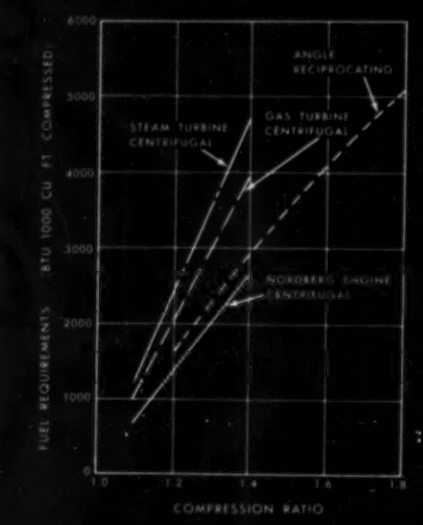
THE NORDBERG *SUPAIRTHERMAL*®

ENGINE-DRIVEN CENTRIFUGAL COMPRESSOR UNIT

Here is the latest development in compact, dependable power for maximum efficiency and economy in gas pipe line transmission service . . . *The Nordberg Supairthermal Engine-Driven Centrifugal Compressor Unit.*

Through use of exclusive design principles, the Nordberg *Supairthermal* spark-ignition gas engine operates at better than 40% thermal efficiency — with correspondingly lower fuel cost, increased horsepower, lower lube oil consumption, and lower maintenance costs per horsepower hour. The *Supairthermal* engine drives the compressor through a close-coupled speed increasing gear mounted on the bedplate extension of the engine.

Here, then, is an extremely compact, efficient engine-driven compressor unit which can be installed at low capital investment and operated at lower cost per horsepower than any other type of gas pipe line prime mover.



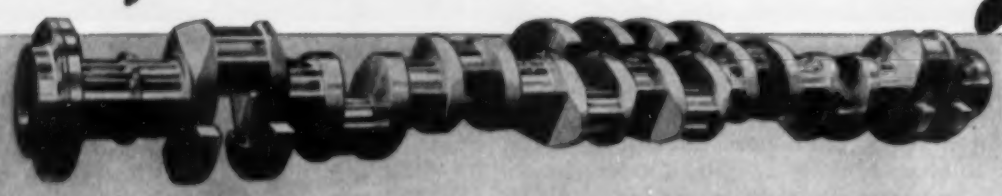
Savings of thousands of dollars per day in fuel costs on large gas pipe lines can be realized with the Nordberg engine-driven centrifugal gas compressor unit because this unit requires less fuel to compress gas than any other modern type of equipment of comparable capacity.

NORDBERG MFG. CO., Milwaukee, Wisconsin

NORDBERG

DIESEL • DUAFUEL® AND SPARK-IGNITION GAS ENGINES

TOMORROW'S DIESELS
Will depend on ERIE FORGE CRANKSHAFTS



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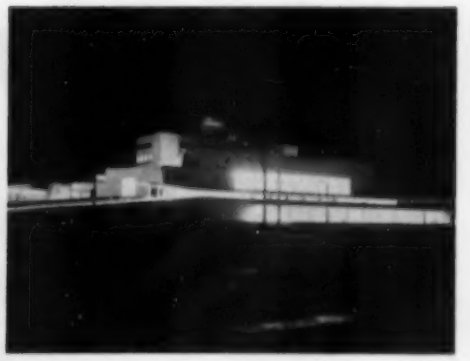
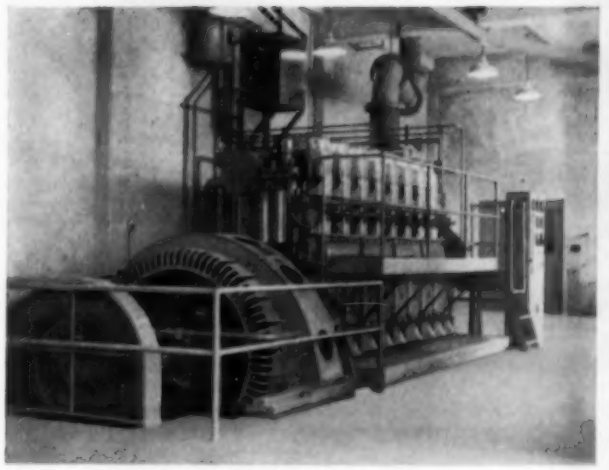


Enterprise emergency power guarantees immediate light for the control tower, runways, and more than 466,000 sq. ft. area in terminal building with its three concourses. Here, 27 loading stations serve 11 airlines.

No blackouts at San Francisco Airport with 1000 KW Enterprise standby unit



First fully automatic unit of its type in the U.S., this Enterprise standby plant also powers drainage pumps in case of airfield flooding.

Compactness of the Enterprise engine enabled easy installation in the existing building.

Power failure at this busy new $50,000,000 International Airport would create emergencies of major proportions. But with the Enterprise diesel-electric, *fully automatic* standby generator set now in operation, this will not happen. Within 13 seconds, if power fails, the Enterprise cuts in to supply all the power needed for normal operation of control tower, runway lights, and other essential airport facilities.

Enterprise Engines serve every municipal power need. You'll find these dependable engines ideally suited for stationary or portable electric generating plants... flood or water supply pumping systems... or for powering sewage disposal plants. Contact the Enterprise sales office in your area today, or write us direct about your problem.

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You a target?

Let's face it . . . we're all targets!

If your plant is not ready with a disaster plan, better act now. There's not a single American plant that's out of range of an intercontinental bomber—and fires, floods, tornadoes **or** explosions can kill you just as dead as an atom bomb.

It costs next to nothing to take a few simple steps which may save hundreds of lives. Here they are. Check them off today.

☐ **Call your local** Civil Defense Director. He'll help you set up a plan for your offices and plant—a plan that's safer, because it's integrated with community Civil Defense action.

☐ **Check contents** and locations of first-aid kits. Be sure they're adequate and up to date. Here, again, your CD Director can help. He'll advise you on supplies needed for injuries due to blast, radiation, etc.

☐ **Encourage personnel** to attend Red Cross First-Aid Training Courses. They may save your life.

☐ **Encourage your staff** and your community to have their homes prepared. Run ads in your plant paper, in local newspapers, over TV and radio, on bulletin boards. Your CD Director can show you ads that you can sponsor locally. Set the standard of preparedness in your plant city. There's no better way of building prestige and good community relations—and no greater way of helping America.

Act now . . . check off these four simple points . . . lives are at stake . . . have you a right to delay?

SPACE FOR THIS **CIVIL DEFENSE** MESSAGE CONTRIBUTED BY

The best locomotives are even better today!

Five 1750-Horsepower GP9's Delivered to Bangor and Aroostook

With 17% more power than its successful predecessor, the General Motors GP9 has new control apparatus which permits utilization of the increased horsepower over the entire speed range. It is able to kick cars faster and more effectively perform a wide range of yard and switching work.

The Bangor and Aroostook operates a variety of General Motors passenger, freight and switching units. With this well-balanced fleet, its Operating Department can match motive power to train weights—can get the best return on motive power investment by *picking the right locomotive for the job.*

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

GENERAL MOTORS LOCOMOTIVES

La Grange, Illinois • Home of the Diesel Locomotive • In Canada: GENERAL MOTORS DIESEL, LTD., London, Ontario

TRACTORS SPEED UNLOADING OF ORE SHIPS

Nine Men, Including Tractor and Crane Operators, Discharge Bulk Cargo Four Times Faster Than 18 Men, Minus Tractor, Formerly Did

THE ingenious owner of an equipment leasing service has come up with a faster method for unloading ore ships through use of dieselized crawler tractors. By reducing the time required to discharge ore cargoes, costs have been lowered and the reputation of the Port of Corpus Christi, Texas, has grown in favor. G. A. Eddy originated the idea and put it into operation in association with the Texas Star Stevedore Co.

Primary factor in the unloading speedup is the novel use of International TD-6 crawler tractors equipped with skid shovels. After a ship docks, a tractor is placed in a hoisting harness and lowered into the hold of the vessel by means of a dockside railway crane. A clamshell then is attached to the crane while the tractor is building a mound of ore below the open hatch. With a loose pile to work on, the clamshell gets a full load every work-cycle and picks up each load without delay.

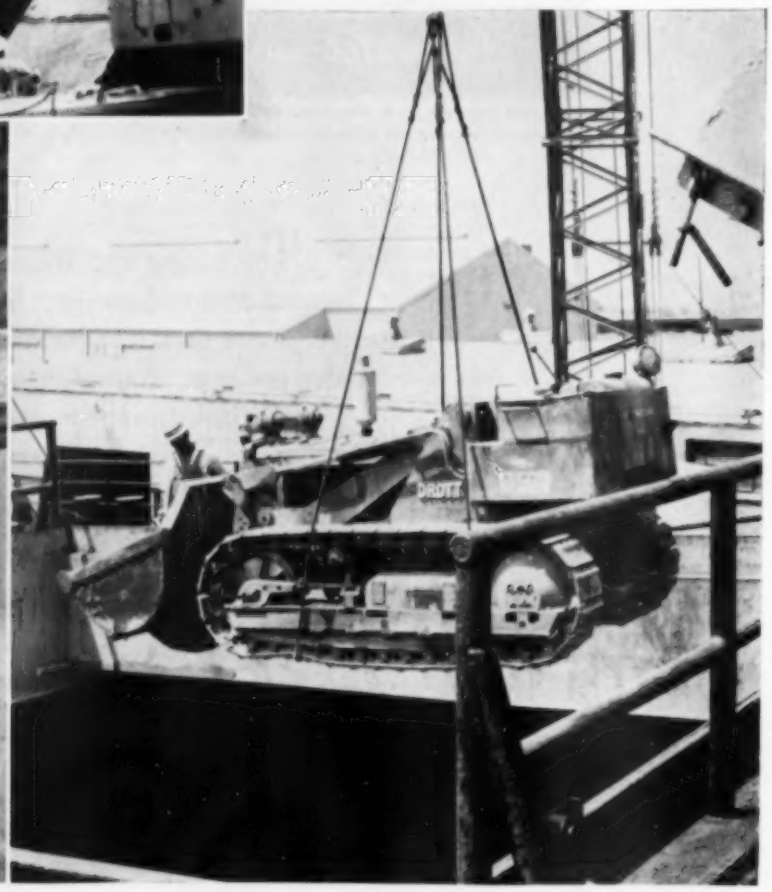
Tractor being lowered into hold to unload 567 tons of asbestos, 135 tons of mica, 6075 tons of lead ore just arrived at Corpus Christi from the Union of South Africa.

While clamshell shovel replaces the harness on the railroad crane, the International TD-6 uses its skid shovel to break loose and pile ore under the hatch.

Formerly, 18 shovelers were required to discharge ore cargo. Use of a diesel tractor to "charge" the clamshell crane permits cutting the labor force in half. Whereas the average unloading speed was only 25 to 30 tons per hour, this application of dieselized power makes it possible to unload an average of 120 tons an hour now. Thus, nine men, including the tractor and crane operators, are doing four times faster the same job 18 men formerly did.

Corpus Christi port officials found that shippers were diverting their ore haulers to ports which had more modern and less expensive discharging facilities. To break the bottleneck which threatened to stifle the growth of Corpus Christi, experiments with various types of material handling machinery were made by Eddy, stevedoring men, and others. These tests led to acceptance of the crawler tractor method. It was found, for example, that the breakout force generated by the skid shoes on the International Drott shovel enabled the operator to assist in unloading 9000 tons of mixed cargo—lead ore, zinc ore, bauxite, and bayrite—in 50 hours.

Job done, the tractor and operator are hoisted back to dockside daylight. Crews of shovelers formerly took two weeks to unload ship that now is ready to sail in three or four days. Loose material enables clamshell to grab full loads, swiftly, each work-cycle.



Community of 6000 persons is served by combination of Cooper-Bessemer dual-fuel engine and older steam turbines.

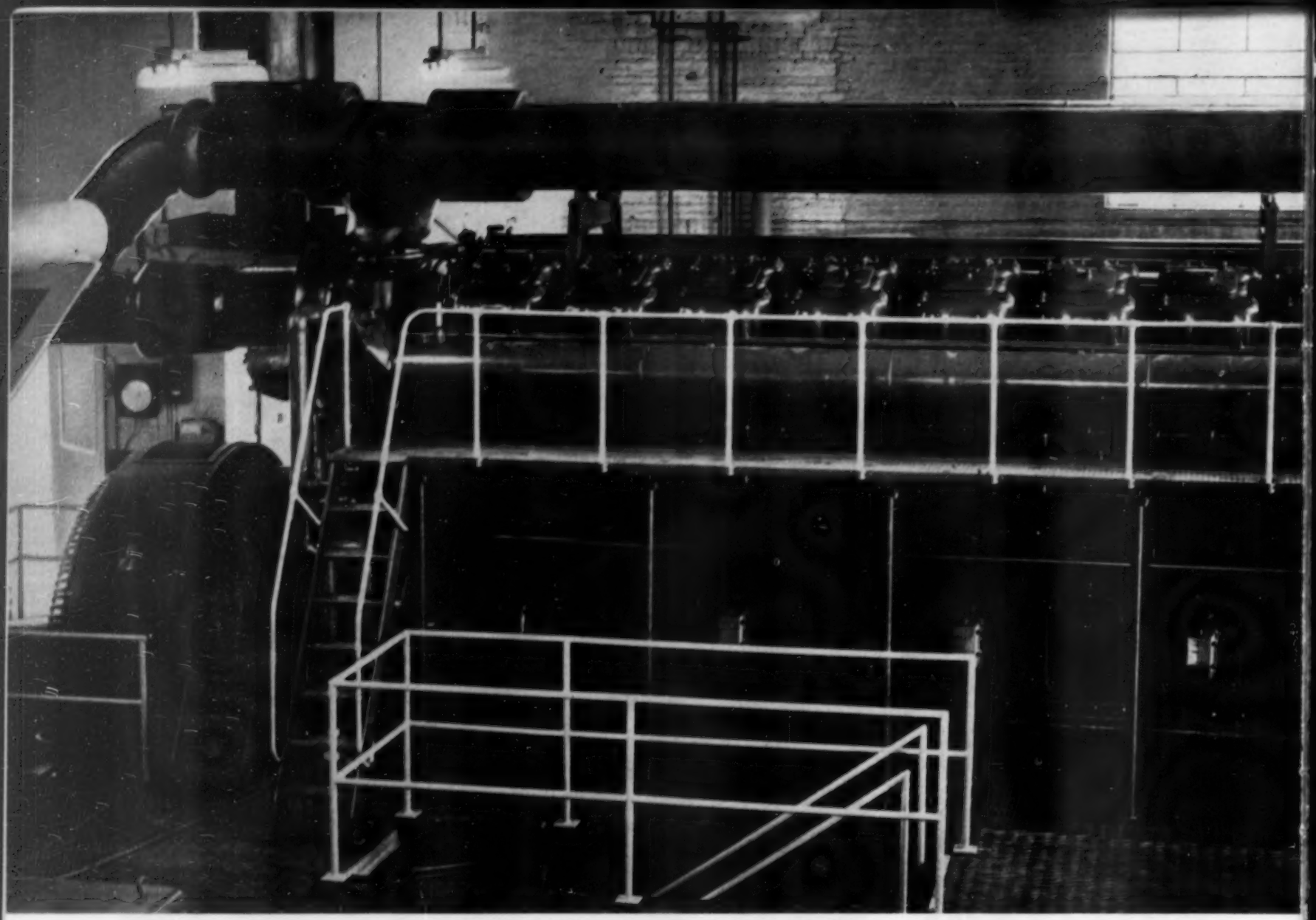
Engine turns 2500 kw Elliott generator; has Cooper-Bessemer turbochargers; Young aftercooler and Alnor pyrometer.

PRINCETON, ILLINOIS

By BRUCE WADMAN

THE city of Princeton, a thriving community in central Illinois with 6000 population, possesses a municipal power plant of which it can be justly proud. The plant is clean, well laid out, and contains balanced generating facilities that feature flexibility and sufficient capacity to take care of future load growth. This favorable state of affairs was achieved with the installation of a big Cooper-Bessemer dual-fuel engine that went into service in July, 1953. Back in 1952, this plant was powered by two steam turbines with a total capacity of 2750 kw. It was faced with a situation of a growing load and insufficient generating capacity. After careful study of all conditions, Burns and McDonnell Engineering Co., Kansas City, Missouri, the consulting engineers, and J. E. Everson, power plant superintendent at Princeton, recommended the installation of a dual-fuel engine to provide for the needed additional generating capacity.

This decision was based upon a number of reasons. First of all, the capacity of the boilers for the steam turbines and the capacity of the steam turbines themselves was filled. To install another steam turbine would necessitate a substantial investment in constructing additional boiler capacity and in purchasing a new steam turbine. The dual-fuel engine fitted into space already available in the power plant building and avoided the construction of additional housing facilities. The diesel engine also offered flexibility and met the requirements necessary for economical power generation. Princeton is in an area where natural gas for the power plant is available on a contractual guaranteed basis only from the middle of April through September. During the rest of the year, gas is only available in limited quantities or not at all, depending on the demand for it in areas that have priority over the Princeton power plant. The dual-fuel engine, therefore, could operate full-time very economically when natural gas was available and could be utilized for peaking service during the period when gas was not available and the engine had to run on straight diesel fuel. Finally, the dual-fuel engine offered the operating economy of a highly efficient prime mover, as can be seen from the kilowatt production cost charts of the engine. As of December 21, 1954, the engine had run for 7524 hours and produced 8,666,000 kilowatts. Jim Moran, the assistant superintendent of the power plant, stated that the engine has had no maintenance so far, with the exception of change-over from dual-fuel fuel injection nozzles to straight diesel nozzles when the engine is run on straight diesel fuel for any



Full side view of Cooper-Bessemer engine shows both turbochargers, Elliott generator, and Young aftercooler. Installation includes Honan-Crane oil purifier, Ross lube oil cooler, American air filter, and De-Laval fuel oil pump.

lengthy period. In order to maintain maximum efficiency on the engine during dual-fuel operation, small nozzle tips are used on the fuel injectors. This allows the engine to be run on fuel oil as low as 3%, whereas large nozzles require about 6% oil.

The Cooper-Bessemer engine at Princeton is a 4-cycle, 16-cylinder, "V" type turbocharged dual-fuel engine, with a bore of 15½-in. and a stroke of 22-in. It develops 3600 hp at 327 rpm and drives an Elliott 2500 kw ac generator. There are two turbochargers, one at each end of the engine, with one turbocharger serving each bank of cylinders. Operating as a dual-fuel engine, it runs primarily on gas, with a small amount of pilot oil for ignition.

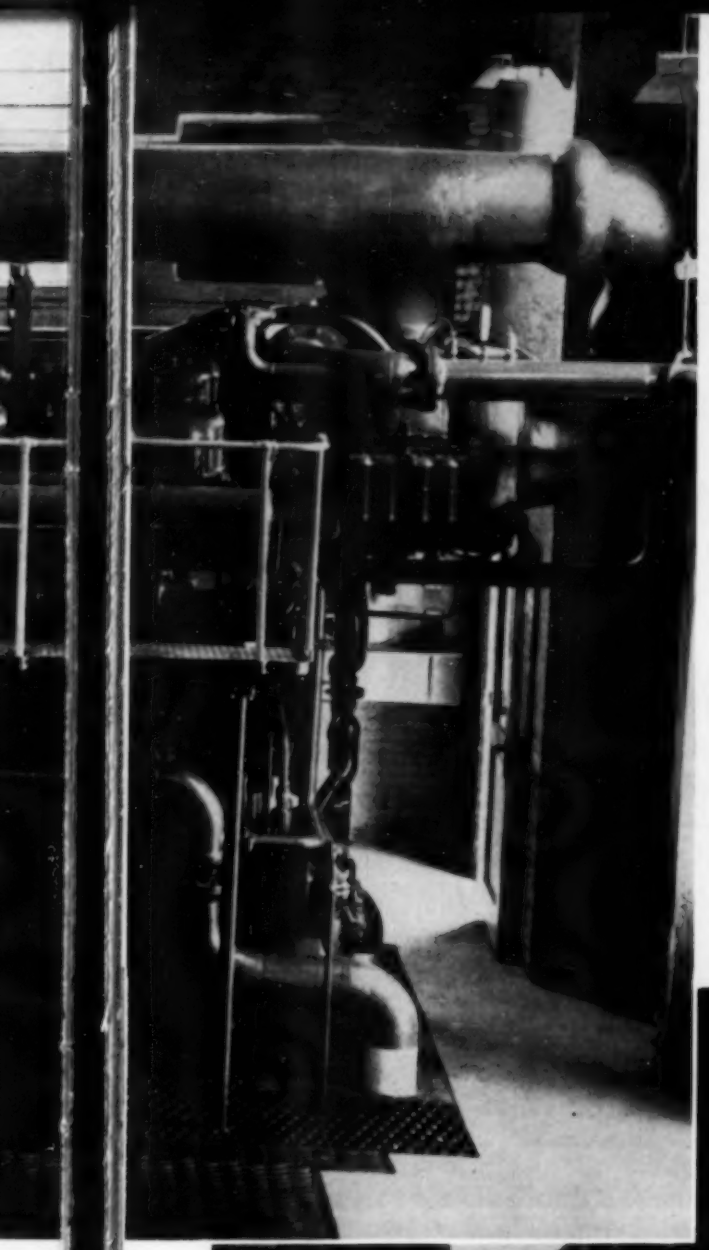
The engine has an interesting control arrangement. A pneumatic control system is used whereby starting air is run through a pressure reducer to obtain the desired control pressure. This system is so designed that the governor controls the various devices to regulate engine operation. Linkage from the governor operates a controlair valve which meters the air to actuators that in turn regulate the manifold air pressure and variable timing fuel shafts. Another portion of the control system is used to operate the safety devices to stop the engine in the event of high water temperature, low lube oil pressure, and also engine overspeed. With the entire control system in operation, the engine can be controlled from the control panel and will automatically change from dual-fuel to full diesel, but requires manual operation in changing from full diesel back to dual-fuel. The necessary controls to change the engine manually from diesel to dual-fuel also are mounted on the panel. With the exception of the control panel, all accessory equipment is located on a level beneath the engine.

In the lube oil system, the pump takes its suction from the lube oil sump built into the base of the engine. The pump is protected from pipe scale or dirt by a suction strainer. Oil goes from the pump to a heat exchanger, then to the full flow filter, through a strainer and returns to the engine lube oil header flange. Lube oil temperature is controlled by a valve located in the raw water system.

The engine jacket water system consists of jacket water standpipe, jacket water pump, heat exchanger, and three way temperature control valve, all installed in the system in the sequence given with the engine water outlet connected to the standpipe and engine inlet connected to the temperature control valve. The raw water for cooling comes from the existing water treatment unit that serves the steam turbines in the plant. The engine is also equipped with aftercoolers to cool the combustion air from the turbochargers. There is one aftercooler for each turbocharger.

The intake air filter and exhaust snubber are both mounted on the roof of the power plant building, a location which contributes to quiet operation, as the power plant is located near a residential section. The fuel oil supply comes from the storage tank and passes through an oil purifier into the daytank. From the day tank, a pump carries fuel to a pressure tank, then through fuel oil filters and into the engine fuel oil system. The natural gas supply line is equipped with a gas meter and a pressure regulator. The gas from the regulator enters a gas expansion tank for the elimination of pulsations, and then goes directly to the gas cock located on the engine.

Other equipment in the power plant consists of the following: a 1250 kw low pressure steam turbine installed in 1938; a 1500 kw low pressure steam turbine installed in 1946, and a Busch-Sulzer 400 kw diesel installed in 1929, now used for standby.



To best illustrate how the load is divided between the dual-fuel engine and the steam turbines, the following charts will show the kilowatt production for the first 11 months of 1954. It can be seen that the Cooper-Bessemer engine is used most and operates most efficiently in the period when natural gas is available.

As of December 21, 1954, the record peak load of the plant was 3050 kw. The additional capacity provided by the new engine has given the plant a total installed capacity of 5250 kw. The engine has also given the plant a high horsepower output in a compact unit that fits into existing plant facilities, and in every way has filled the bill in answering Princeton's power problems.

List of Equipment

Engine—Cooper-Bessemer 16 cylinder, "V" type dual-fuel, 3600 hp at 327 rpm.
Generator—Elliott 2500 kw.
Governor—Woodward.
Turbochargers—Cooper-Bessemer.
Aftercoolers—Young.
Fuel oil purifier—Honan-Crane.
Lube oil filter—Commercial.
Lube oil strainer—Elliott.
Lube oil cooler—Ross.
Jacket Water cooler—Ross.
Lube oil pump—DeLaval IMO.
Jacket water pump—Allis-Chalmers.
Raw water pump—Allis-Chalmers.
Fuel oil transfer pump—Roper.
Starting compressor—Quincy.
Air filter—American Air Filter.
Exhaust snubber—Burgess-Manning.
Safety Controls—Fulton-Sylphon.
Pyrometer—Alnor.
Switchgear—General Electric.
Temperature Control Valve—Powers Regulator.

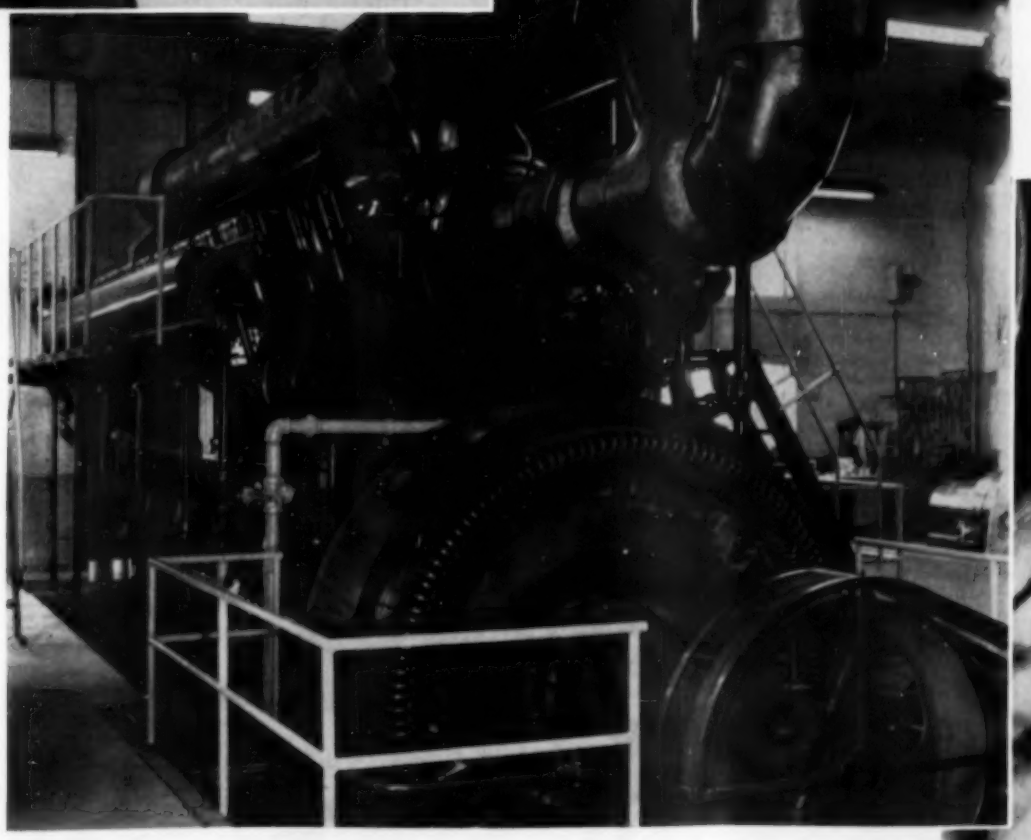
CHART NO. I
OUTPUT, 11 MONTHS OF 1954

	kw	cost mills/kwh*
January	56,000 (oil)	9.46
February	49,000 (oil)	9.50
	17,000 (d-f)	3.94
March	282,000 (d-f)	4.99
April	465,000 (d-f)	4.31
May	919,000 (d-f)	3.96
June	885,000 (d-f)	3.92
July	859,000 (d-f)	4.05
August	862,000 (d-f)	4.10
September	840,000 (d-f)	4.17
October	925,000 (d-f)	4.22
November	318,000 (d-f)	4.90

*Costs include fuel and lube oil consumption.

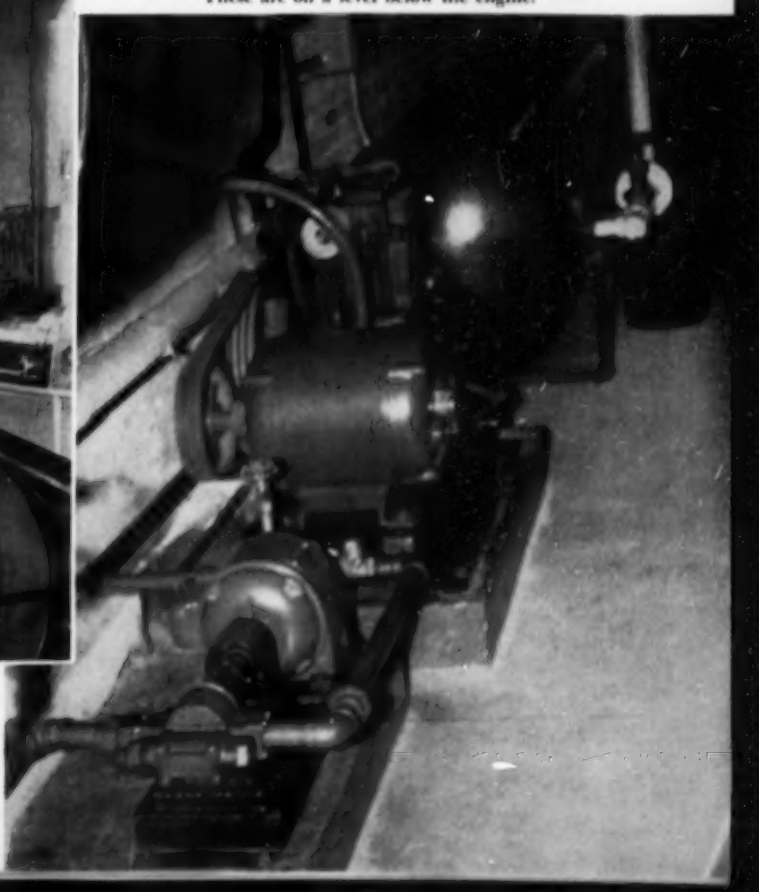
CHART NO II
KW LOAD CARRIED

	By Steam Turbines	By Station
January	1,187,000	1,243,000
February	1,029,000	1,078,000
March	904,000	1,169,000
April	606,000	1,071,000
May	107,000	1,026,000
June	172,000	1,057,000
July	200,000	1,059,100
August	219,000	1,081,000
September	211,000	1,051,000
October	227,000	1,152,000
November	885,000	1,203,000



The exhaust snubber is of Burgess-Manning manufacture. The governor is Woodward and General Electric built the switchgear.

Starting air is compressed in a Quincy unit, shown here with the motor-driven Roper fuel oil transfer pump. These are on a level below the engine.



GAS TURBINES MAKE HISTORY

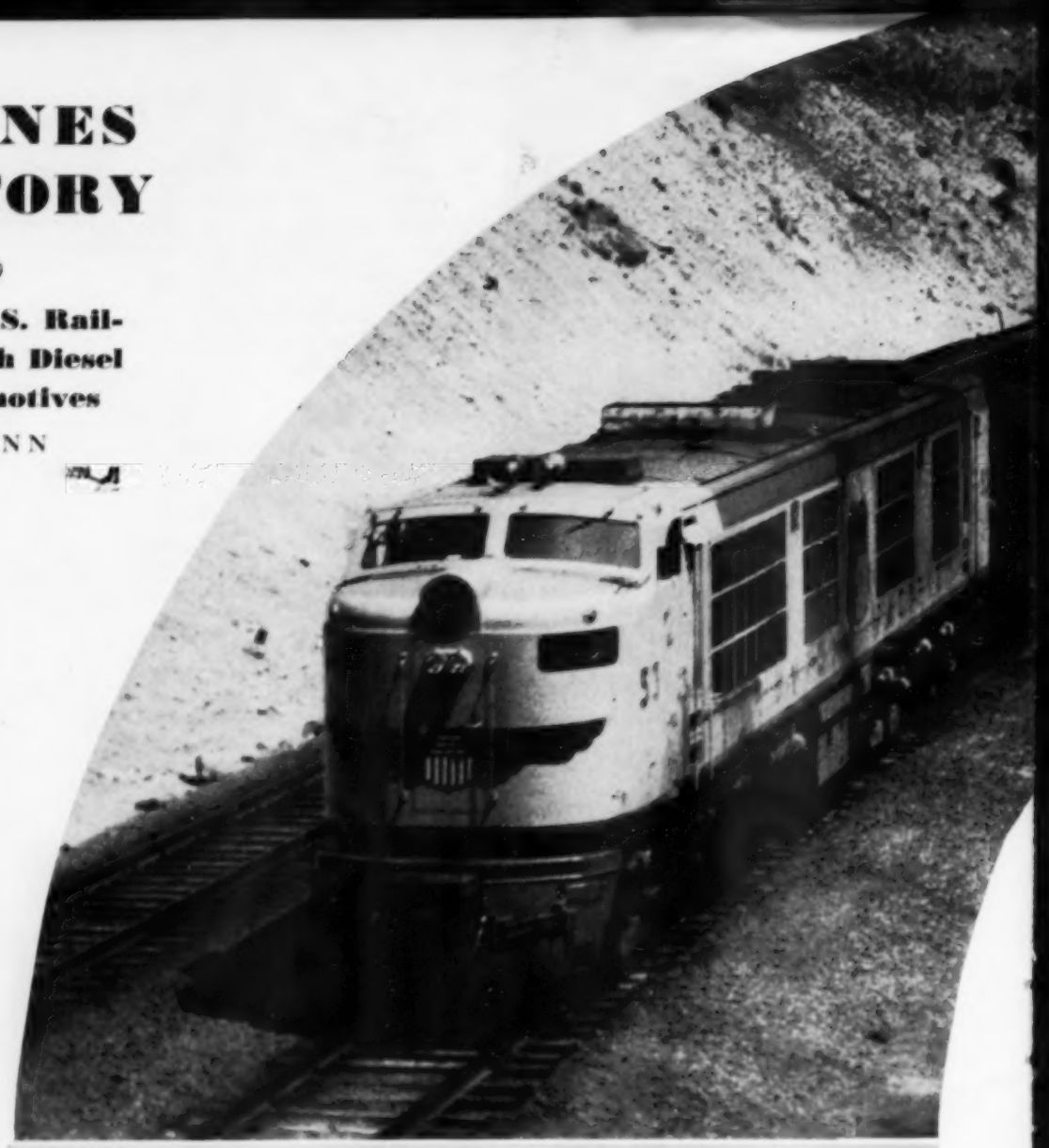
(Last of Three Articles)

Author Sees Place in U.S. Railroad Operations for Both Diesel and Gas Turbine Locomotives

By CHAS. F. A. MANN

As a part of this study of gas turbines on the Union Pacific, we were given special permission from the President's office to ride through three divisions to see at first hand both the typical operating problems and how turbines function. It is a far cry from the theoretical approach in the drafting room and in the engineering offices, to the cab ahead of 85 cars of freight that some trainmaster wants moved in a hurry. The location of a drinking water cooler next to an excessively hot cab heater is more important than vanadium in the residual ash. The fact that the high, steady tractive effort against slippery rail on a hill overtaxes the capacity of the pneumatic sanders to keep the rails hard, reminds the engineer that the turbine generates more power than can be used on a heavy pull without spinning the wheels. The automatic transition sometimes, on bad rail, works in and out so fast, between wheel slips, as to drive the engineer nuts. And way back in the builders specifications it suggests some 3700 lbs. of ballast can be applied to the two front trucks to hold it down tighter. Tonight, as we climb the hill east of Green River, we could use it, despite the fact that axle weights are 12,000 lbs. heavier than on the diesels.

Extra # 73 East, with Ted Brosen, engineer, in charge, leaves the Green River yard at 5:15 p.m. with 86 cars and 5300 trailing tons, bound for Rawlins, 134 miles away. The unseasonal rain, plus the fact that a streamlined diesel passenger went out ahead, creates bad rail. There is a peculiar, recurring operating headache noted everywhere that whenever a streamliner goes uphill ahead of a freight, the rail is slippery and coated with a fine film of oil. Diner and toilet drainage and exhaust from propane generator sets under the coaches is blamed. At the top of the 1% grade we are doing 36 mph. and on level or very light adverse grades we reach 45-55 mph. with one or two spots a bit faster. The absence of excessive noise and almost total absense of rumble or vibration dispels much of the misunderstanding and rumor drifting around about gas turbines. Obviously many of the comforts and control facilities have been borrowed outright from the diesels. It was remarkably noticeable that neither the head brakeman nor the fireman made a single trip back through the locomotive on the run. No. 73 is one



***Above, center*—The first series of General Electric's gas turbine locomotives delivered to the UP had enclosed catwalks.**

The last 15 of the locomotives delivered have open catwalks. Filters in the side panels were eliminated.

One of the original gas turbine locomotives delivered to Union Pacific is shown pulling a heavy freight train through Wasatch Canyon.

of the new units with open catwalks instead of a full width cab and had only 512 turbine hours and 12,849 miles on it as of October 31, 1954, 10 days prior to our trip. Arriving at Rawlins at 8:45 p.m., we had a short stop and crew change and departed for Laramie at 9 p.m. While the mileage is shorter, there is one bad hill at Creston, the true Continental Divide. It took three hours and 30 minutes to go the 134 miles from Green River to Rawlins, and slightly less from Rawlins to Laramie. Engineer Willard Rucker is a gas turbine fan and apparently is surprising his supervisors by keeping up on turbine technology. It must be remembered these engine crews have to be skilled. They run gas turbine, diesel and Big Boy steam interchangeably, every month. An engine crew never knows which type of locomotive it will be assigned from one run to the other. In some ways, these Union Pacific engine crews have to be smarter and more open-minded than other railroad crews. The eastward ranging bad weather dumps rain on the Big Hill at Creston, and we slipped badly and dropped back to 11 mph. With heavy sanding all the way. The remarkable 20-notch traction motor control is superior to previous types in that it is smooth, very responsive, and power is varied without jerks or fuss. The fully automatic transition is the smoothest yet put into a locomotive. Some engineers say it is too sensitive.

Table III
Freight Train Cost of Service
For September, 1954
Union Pacific Railroad

Per 1,000 Gross Ton Miles Figured in Cents

	Steam	*Diesel*	*Turbine*
Repairs	27.44	16.56	14.45
Engine house expense	14.89	3.66	2.24
Fuel	54.99	20.12	22.23
Lubricants	1.47	1.40	.47
Other supplies	5.65	.16	.04
Enginemen	18.28	18.79	14.22
Trainmen	22.42	23.34	15.54
Total	145.14	84.03	69.19
Same for Year 1953	130.67	85.78	87.32

The impressive thing about the road operation of a gas turbine is that the power plant seems to run at top speed from the moment of starting to shutback to idling when entering a terminal or going down a long hill. What variations there are in rate of fuel feed do not register in the speed of the turbine. The midget heating boiler causes more fuss in the operating cab than all the rest of the gadgets put together. The steam pressure varies from 90 to 240 lbs. with great rapidity. Sometimes the lights flash and bells ring but everything keeps going. The immediate problem in all turbines appears to be further simplification of controls and housecleaning some gadgets off the instrument panels. Diesels were the same way when they began hauling freight in 1941, as this writer reported from the pioneer Santa Fe experiment. And later on the Western Pacific.

Exhaust and intake noises remain so constant that after the first hour, you become oblivious to them. Normal conversation is possible at all times in the cab at all loads. Dynamic braking held the train to 60-65 mph. downhill from Creston. No air.

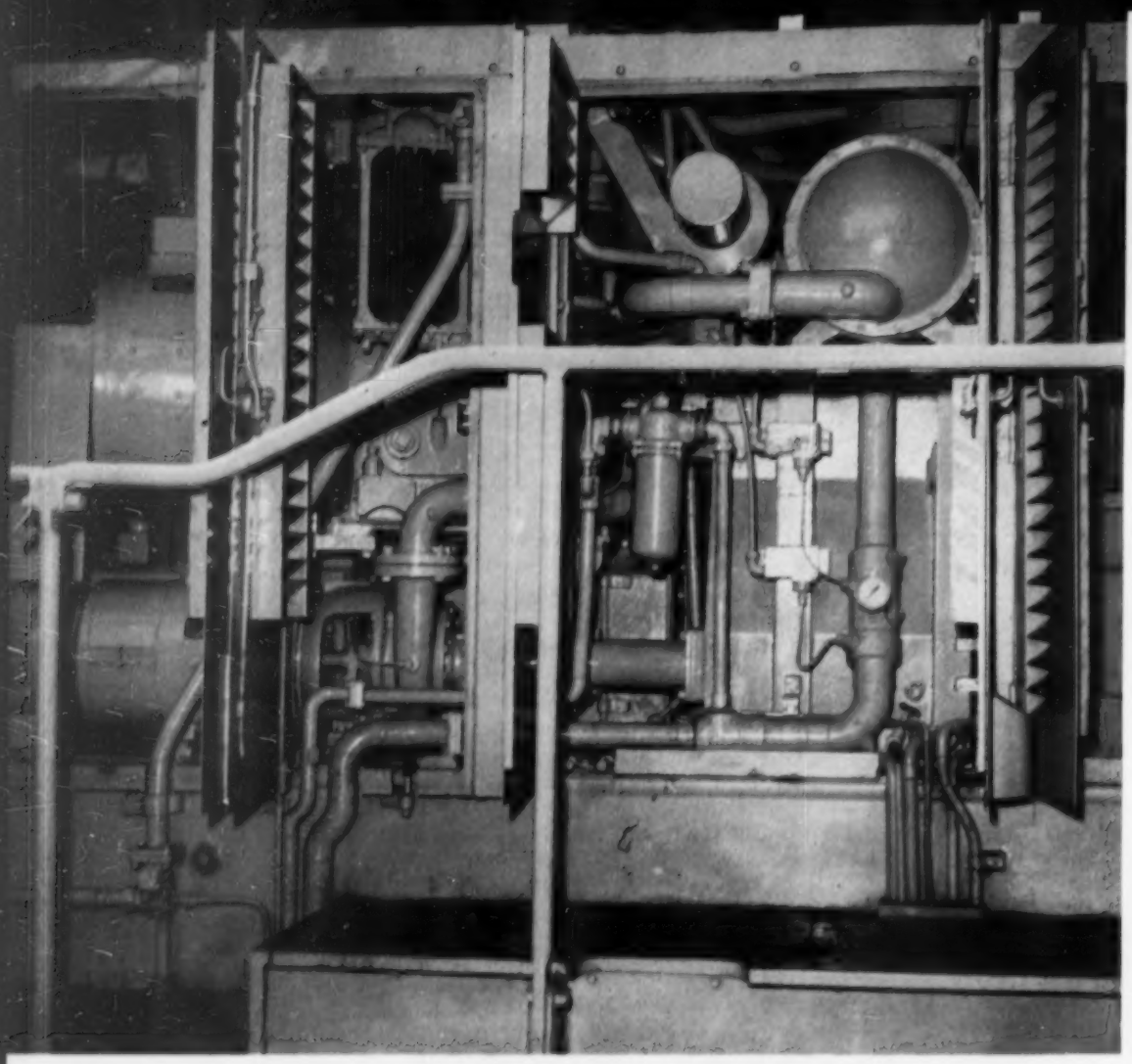
Detraining from No. 73 East at Rawlins for a night's sleep, we are lucky to board Xtra No. 52 East. This is the second production model which came on line in April, 1952 and had already passed 260,000 miles of operation by November 1, 1954. By contrast, its wide cab and 126 filter panels (since removed) make it seem bulky and formidable. Again, Engineer John Deleplaine turned out to be a student and philosopher. He stated flatly there's no difference between running the gas turbine over the big Sherman Hill, highest point on the System, and running a diesel. He is a Union Pacific veteran with a West-Virginian eye to thrift. Every chance he gets he shuts off the turbine to save the company money! He says the younger engineers seem afraid to start the turbine up and are afraid to shut it down. He advocates a bigger diesel auxiliary power plant out in the back compartment, so the turbine can be shut off completely when maneuvering in yards (on level track), doing light switching, coasting downhill in regenerative braking, and all the rest. Why waste fuel in the gas turbine when it is a machine designed to run full power, full speed, full load, when the business of running a freight locomotive calls for highly variable operating conditions?

It was a rough trip up the Big Hill out of Laramie. At one point we completely stalled to a dead stop because of slippery rail. It took an hour and a half to go 14 miles. Coming out of Laramie, we left the long ice dock at 4:45 p.m. Part of the load of 85 cars (71 loads and 14 empties, a total of 4300 tons), had to be re-iced. Laramie is a big re-icing point on the Union Pacific for West Coast perishable freight. A couple of miles east, on main track No. 1, we began to slip badly due to wet rail. Nothing would hold the wheels. Finally, grinding to a stop, the locomotive was uncoupled. The train was braked tight. We proceeded with the engine uphill for about six miles with sanders full open. Backing down, the sanders were still left open. Coupling up again, we managed to start the train and grind uphill on the triple-sanded rails at speeds below 10 mph. It is here that everybody agreed the 12-motor, 12-axle, 3-unit EMD diesel freighter was superior to the gas turbine. Engineer Deleplaine says he regularly takes 4500 tons up the same hill, faster, with a 4500 hp. EMD diesel, than he does with the gas turbine that would pull 5000 tons on dry rail. The cold fact remains that in periods of bad rail, the load behind the gas turbine must be reduced to bring it up to normal operating speed. The 12-motored diesel has advantages on heavy pulls at slow speeds.

This section of the Union Pacific mainline is a classic example of the astuteness and wealth of the company. To cut down the adverse westbound grade from Cheyenne to about .7%, from 1.50%, the company has just spent $10,000,000 building a low grade line from Cheyenne to Dale, just west of Sherman Hill summit. It is nine miles longer and is the costliest section of railroad track ever built on earth. The old divided 2-track line and the new line are operated as Tracks 1,2,3, from an elaborate centralized traffic control setup in Cheyenne, so that any track can be used in either direction for anything that comes along.

At the Sherman Summit, Engineer Deleplaine put the train into regenerative braking with the turbine idling for traction motor excitation. He grumbled because he couldn't use the diesel. We rolled down at 40 mph., then dropped back to 25-30, and coasted to a stop at Cheyenne yard west entrance at 7:45 p.m.—three hours for the 56 miles. Most of the time was spent in the first 13 miles. Train crews blame the company for deliberately overloading the turbine. The company doesn't seem to mind a-tall . . . they're collecting statistics!

When we stopped at Cheyenne yard entrance, the turbine was shut off in proper cycle and the diesel plant started up. We dismounted and shook hands and came away a more sober correspondent. After 25 years of experience with diesel, and diesel operating economies, it is our considered conclusion that in the middle of the vast, complex U.S. railroad operating picture, there is a sizeable spot for the gas turbine locomotive. The diesel



Service doors from catwalk lead to heat exchanger on Cummins diesel auxiliary engine, compressor jackets, lube oil heat exchanger, and cooling water storage tank. Radiator is in roof, above.

made this economically possible; and the diesel will continue to do 75-80% of the work on U.S. railroads for the next century. Furthermore, we believe the delicate balance of fuel costs and availability will set the pace in both directions and that the turbine will spur the diesel to bigger and better things. And it would not surprise us if Union Pacific, when their warranty period ends, will gingerly lift a conventional 600 hp. General Motors-EMD switcher unit out of a yard switcher and put it into a General Electric gas turbine locomotive and do just what loyal, wise old Engineer John Deleplaine suggests: give the turbine a helper big enough to permit it being shut down for everything except full speed operation on the road. The Union Pacific is just that smart!

As indicated, development work is going ahead constantly. Elimination of the complex, hard-to-clean-and-maintain 126 side air filters has worked wonders. The turbine runs better then ever. This permitted the last 15 GE turbines to have catwalks and a narrow housing moved inboard to the line of the equipment items, making it easier and faster to service and repair the units in the shops. The roof overhang has been left so the train crew can gain sheltered access at all times. Combustion chambers have been lengthened 12 in. to improve combustion characteristics. The first stage nozzle diaphragm, heretofore a solid ring, has been split to facilitate removal. Piping and wiring has been improved and simplified. As stated, the steam-cleaned filters for turbine fuel have been done away with, and the heating boiler size cut in half. Static excitation has replaced the complicated amplidyne excitation in the interests of simplicity and maintenance. Dynamic braking controls have been modified to permit operation with diesel auxiliary power for excitation. The next step is a bigger diesel. Union Pacific and G.E. are both tinkering with ceramic coated combustion chambers and possibly turbine blading, stealing a leaf from the jet aircraft practices already under test.

Back in the Omaha office, performance figures, in the chilled form, supercede opinions and sandhouse chatter out on the road. Perry Lynch, the able Executive Vice President of Operations, whose entire staff cooperated generously with this writer, is all smiles these days. As figures pile up, he is certain that Union Pacific has again pioneered the way for world railroading with its big new fleet of gas turbine electrics.

Read Table III for the answer. The overall statistics on diesels, of course, are a composite from the entire fleet. Many units operate in train limit territories, in full crew law states, and where train crew pay is based on weight on drivers. This raises diesel engine crew labor costs above the average. The smaller and newer gas turbine fleet operates under more optimum conditions and heavy repairs have not yet begun on most of the units. By placing them solely in high-tonnage, high mileage service—like diesels were placed against steam 13 years ago—they can make a top showing from the start.

Union Pacific will shortly undertake research into utilizing the vast waste heat going out through the roof in a jet-like roar with billions of calories or btus warming the blue sky each minute. Some of the UP staffers have dreamed of a bigger exhaust port in the roof, lined with steam tubing. Others have dreamed of a by-pass to a waste heat boiler, with complete rearrangement of the "furniture" inside the cab. Diesels went through this rearrangement process, too, if you will remember, with excellent results. Nobody expects the existing gas turbines to last much longer than five years without becoming obsolete. And nobody worries, for American ingenuity is again on the march and the railroads of tomorrow are yet to be born. The mechanical, operating, economic and financial aspects of the whole Union Pacific gas turbine program have aroused the world. There is no other development like it anywhere on earth at the present time. America and the Union Pacific are leading the way.

List of Equipment

Turbine—1 G.E. locomotive-type, oil-burning 2-stage gas turbine with a 15-stage axial flow compressor. Rated 6900 rpm. and 4500 hp. for traction at 1500 ft. elevation and 80°f. ambient temperature.

Gear box—1 G.E. type ST 216B, single reduction double helical gearing with one pinion and two driving gears, reduction from 6900 rpm. to 1645 rpm.

Traction generators—4 G.E. type GT 576, shunt wound, 6-pole dc machines, driven in pairs from each end of the two larger gears in the gear box.

Traction motors—8 G.E. type GE 752, series wound, 4-pole, forced ventilated dc.

Traction motor blowers—8 G.E. type GYA-18, axial flow, ac. motor driven with vortex cleaners.

Turbine auxiliary alternators—2 G.E. type ATB-954, 3-phase, 6-pole alternators rated 150 kva.

Diesel alternator and dc. generator set—1 G.E. type GMG-161, consisting of alternator and dc. generator directly connected to diesel engine.

Air brake—New York Air Brake Co. 24RL.

Battery charging motor generator set—1 G.E. type GMG-160 consisting of 3-phase, 4-pole induction motor driving a 4-pole dc. generator rated 35 kw. at 75 volts.

Generator and auxiliary air cleaner blowers—2 G.E. type GYA-19 axial flow ac. motor driven with vortex cleaners.

Diesel engine—1 Cummins NHRBIS-600 rated 270 hp. at 2100 rpm.

Air compressors—2 Gardner-Denver type ABO, 2-Stage, 3-cylinder water cooled.

Fuel heating steam generator—1 Vapor Heating Corp. type OK 4608, rated 800 lbs. per hour at 200 lbs. pressure.

Radiator—1 Perfex, seamless tube, 4-core, 2-pass unit with two induction motor-driven propeller type fans.

Miscellaneous accessories—Pyle National oscillating headlight; Chicago Pneumatic speed recorder; Solex glass windshields; Kysor steam cab heaters with fans; Calrod electric emergency cab heaters; 6 Ansul-Dugas dry chemical 30 lb. fire extinguishers; 2 Prime rear vision mirrors; Williams-grip traction motor connectors.

THE DIESEL TRUCK AS A TOOL

By MARK OGDEN

WHILE diesel trucks still are basically and overwhelmingly transportation vehicles, an amazingly large number of them, in addition, have become *tools of production*. As powered tools, today's trucks dash off to all kinds of isolated sites to perform all kinds of heavy jobs. Dieselized trucks and equipment are constantly reaching higher degrees of mobility and flexibility as increasing numbers of diesel engines are being built to specifications that permit varied usage.

By placing heavy-duty power . . . and powered tools . . . on wheels, men now perform an ever-widening variety of work, economically and swiftly, in scattered localities. Formerly, many of these jobs were done laboriously by hand, slowly with horses, or expensively with steam power. Others were left undone because it would have been prohibitively costly to have done the work. It either took too many men too long, or it cost too much to build up, or to move in, the machinery required.

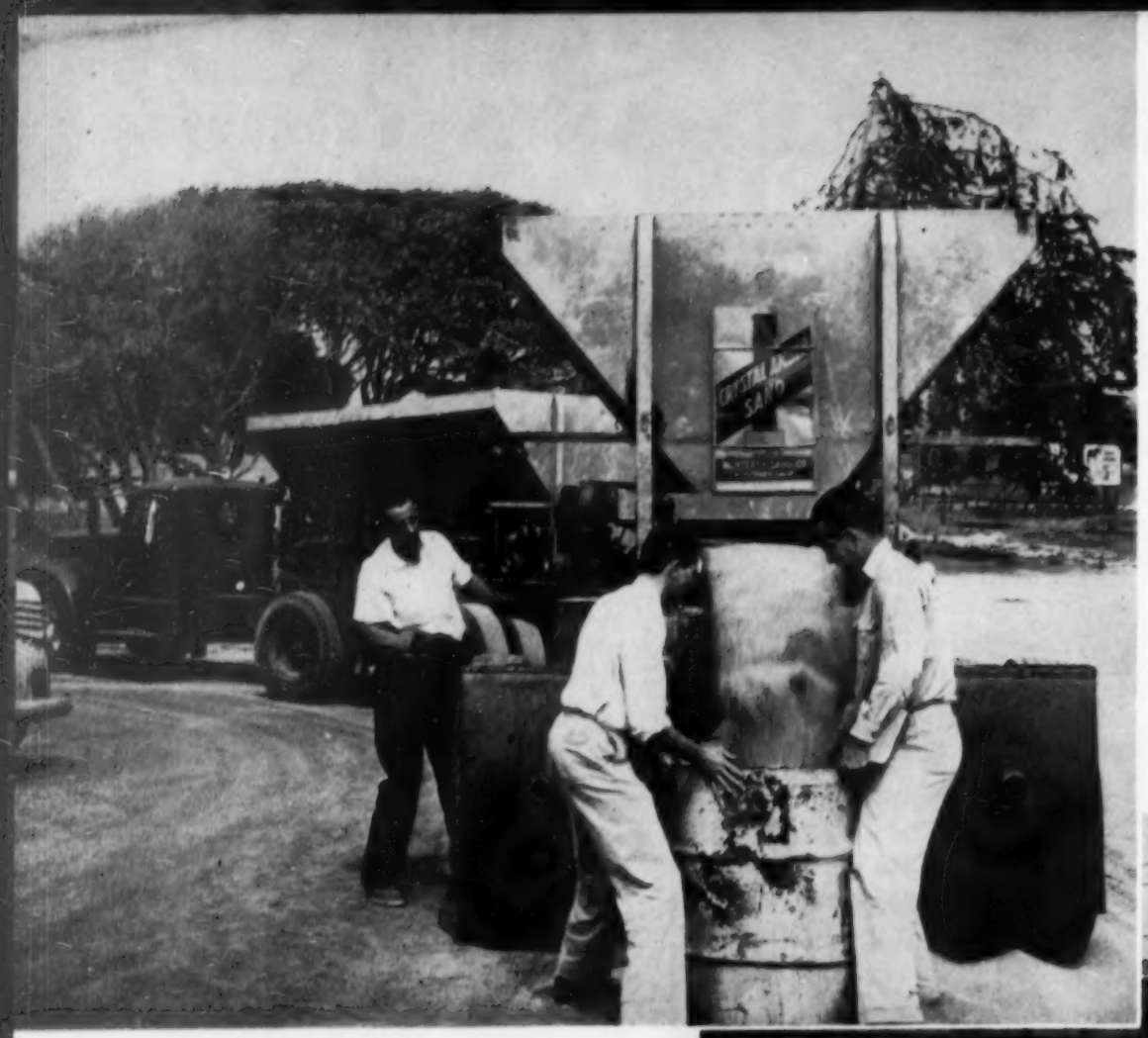
Trucks that can be called "tools" might be classified into three general groups: (1.) Trucks whose engines have been tapped with power takeoffs to utilize the propulsion engines for other work. (2.) Miscellaneous "rigs" which ingenious owners have built up to provide mobile power for specific types of jobs. (3.) Original equipment with two engines, one for propulsion and the other for hoisting, drilling, pipe-laying, and other purposes.

With the greatly increased registration of heavy-duty trucks, the need for heavy-duty salvage service also has grown. Demand is frequent in mountainous country, and only the heaviest, most powerful equipment will serve. Therefore, trucks with rugged, thoroughly reliable diesel engines are in growing favor. Such engines, experience has taught, will take the tow truck to the wreck without much danger of road failure, and they have the stamina to motivate a winch with 10-to-15-ton loads. They can snag heavy tractors and trailers out of precipitous ravines and tow them to repair shops or junk yards without strain.

Many examples could be mentioned, but a good one to cite is the Regalia Machine Works, Napa, Calif., because of the variety of work assigned to this firm's Cummins-powered Autocar. Besides serving truck owners and insurance companies as a wrecker, the Regalia rig also gets frequent calls to hoist such heavy objects as safes through office

Top—Truck cranes are becoming increasingly important in construction, logging, and industry. This one was photographed erecting steel for new air terminal in San Francisco.

Bottom—More and more truck service and repair companies are finding that dieselized tow trucks are essential. In such trucks, the deciding factor in favor of diesel engines is not so much economy but dependability.



"Target" unloading of sand is possible with hopper-conveyor system devised by Monterey Sand Co. for use with Grifall Bros. fleet of diesel trucks

windows. It is called upon to load and unload heavy machinery from flatcars and for the erection of steel girders. A 200 hp diesel with a power take-off operates dual winches mounted behind the cab. The boom is telescopic. On flat ground, the truck can pick up and walk off with 11-ton loads easily. This truck originally had a gasoline engine, but the owner repowered it when he converted it to a crane and tow truck.

A more unusual utilization of diesel trucks as tools of fairly high precision can be found wherever Monterey Sand Company sand is delivered by trucks belonging to Grifall Brothers, Mountain View, Calif. They specialize in making bulk deliveries of cement, sand, and lime. Six of their hopper-bottom trailers are equipped to make bull's eye deliveries of the sand produced by the Monterey producer for sandblasting and water filtration. If necessary, Grifall drivers can back up to a building and unload through a window or door into a 50-gal. drum. Such "target" unloading is done by means of a conveyor belt strung over rollers which extend the length of the tandem trailers. The top of the belt runs fore-to-aft, directly underneath the hoppers. A small gasoline engine, mounted on the back of the trailing trailer, turns the belt as the sand is discharged onto it in controlled quantities.

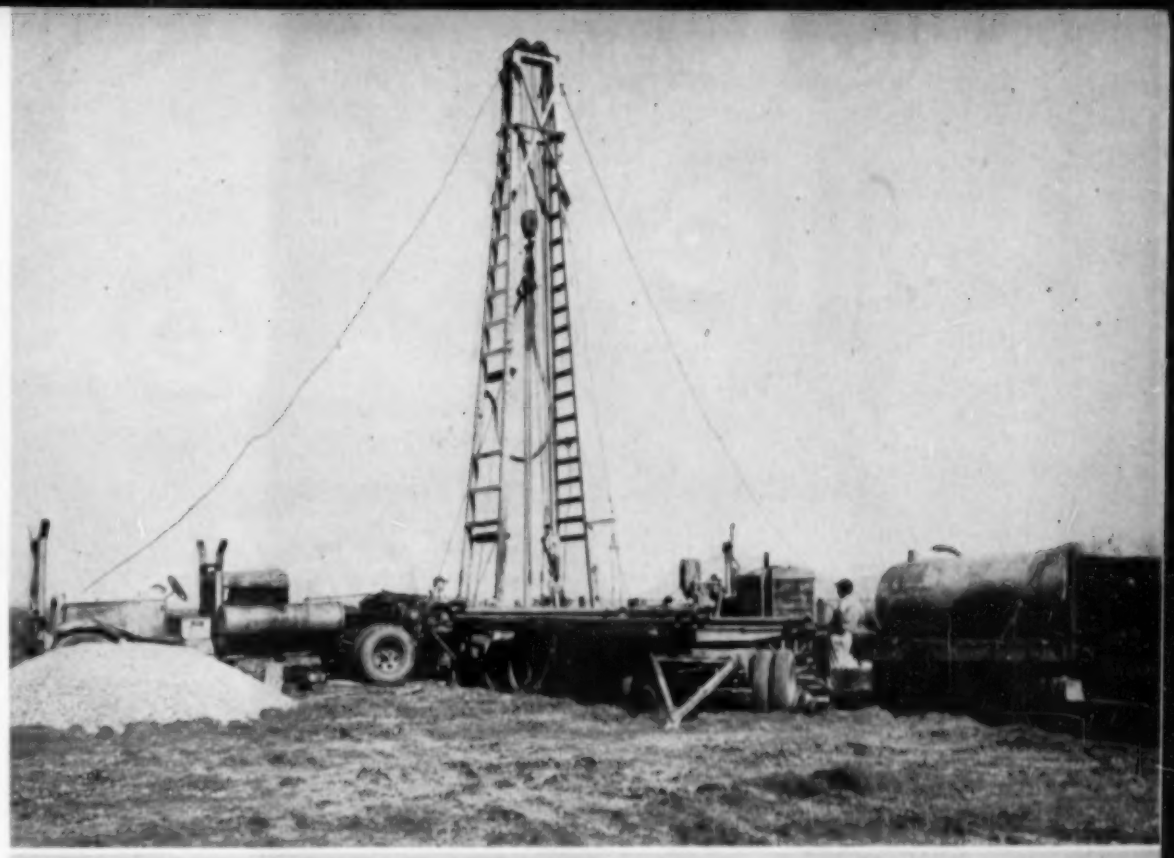
One of the most ingenious uses of diesel trucks encountered by this writer is the invention of R. A. Berg, president of Port Costa Brick Works, San Francisco. He came up with a device that not only saves labor and loss of bricks through damage, but also makes it possible to spot pallets of bricks in close proximity to where the masons will need them. He has equipped four of his Cummins-powered Peterbilt trucks with this loading and unloading apparatus. Power is transmitted from the rear of the Cummins diesels through power take-offs. A series of rollers are mounted inside the longitudinal frame members of the trucks and their trailers. Chains over sprocket wheels turn the transfer rollers to move pallets of bricks into position on the truck, as can be seen in an accompanying photograph. The truck is loaded first. It then backs up to its trailer and transfers the pallets onto the trailer by means of the rollers operating just above the level of the slide rails. When the load is transferred, the truck is disconnected and is driven back to the stock pile to load itself again. As can be seen from the picture, pallets are picked off the ground by two steel arms that are lowered and then elevated and swung in about a 200-degree arc. The pallets are lined up by a brickyard workman with a fork-lift truck, but otherwise the whole loading and unloading operation is done automatically by the truck driver. One man can load or unload in approximately 20 minutes. Formerly each driver required a helper, and a forklift had to be at the delivery point. Otherwise the bricks were tossed off slowly and tediously by hand with costly breakage. The dieselized truck can operate on soft ground where forklifts get stuck. Contractors like to have their bricks delivered in neat stacks because handling becomes so much easier and faster. Also, the pallets can be strung along a wall instead of dumping bricks in one pile which requires workmen to spend time and effort in keeping masons supplied.

Several original equipment manufacturers, of course, make rubber-tired chassis upon which heavy

Driver can load or unload truck and trailer with pallets of bricks in 20 minutes through use of power take-off on rear of Cummins diesel which motivates loading arms and transfer rollers.

Diesel truck engine powers swing and hoist drums on this highly portable log loader. First of these was so successful that California logger built six.

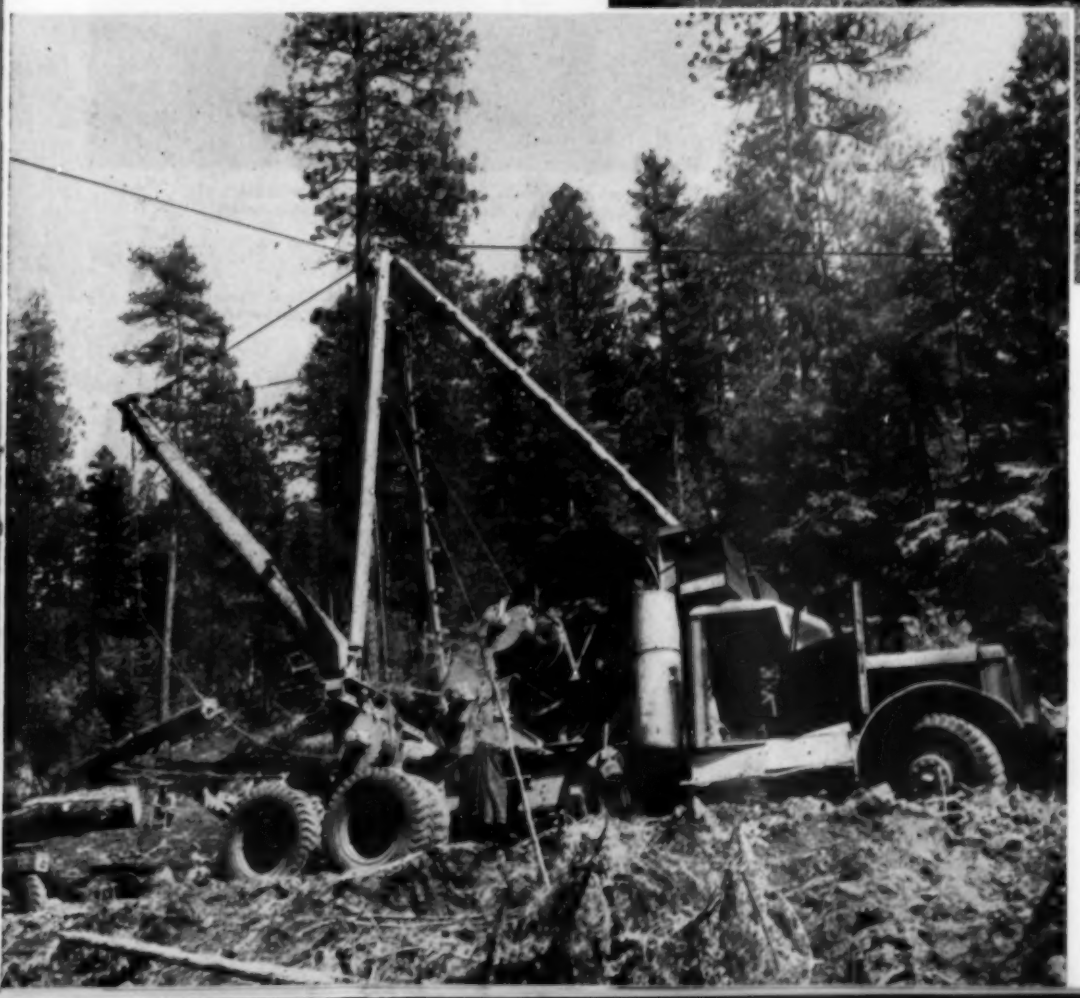
Well drillers were among first to make their diesel trucks serve them as tools. This truck transports derrick and drilling engine, pulls trailer with dieselized mud pump conditioner.



cranes can be mounted for use in the woods to load logs onto trucks. These are being used in increasing numbers instead of the stationary "donkeys." However, the mobile loader shown in an accompanying picture was one of six built by the shop of the Loveness Logging Co., Canby, Calif. In each instance, mechanics took an old, heavy-duty logging truck, built a cab back-to-back with the driver's cab, and tapped the drive shaft with a power take-off to motivate a winch. A separate set of controls in the backward-looking cab gives the driver control over the swing and hoist drums. Flexible units of this kind are especially valuable in what loggers call "cleanup operations." This usually means that the logs to be loaded are scattered and that the access roads are primitive. All the easily gotten logs were taken out of the woods previously. To pick up the "strays" with a slow-moving track-roller loader would make the cleanup far too costly.

Well drillers were among the first to recognize the possibilities of making their trucks into tools. Formerly, they towed drilling rigs behind their trucks and moved in a stationary engine to run the drill. The truck was parked, unproductive, while actual drilling was in progress. Now, many well drillers have mounted their drills on the rear of their trucks with the derrick hinged to lay down, partially resting on the cab, while in transit. Sometimes the truck's engine is used to drive the drill, but often a separate engine is mounted on the truck frame to be used for drilling purposes. The latter

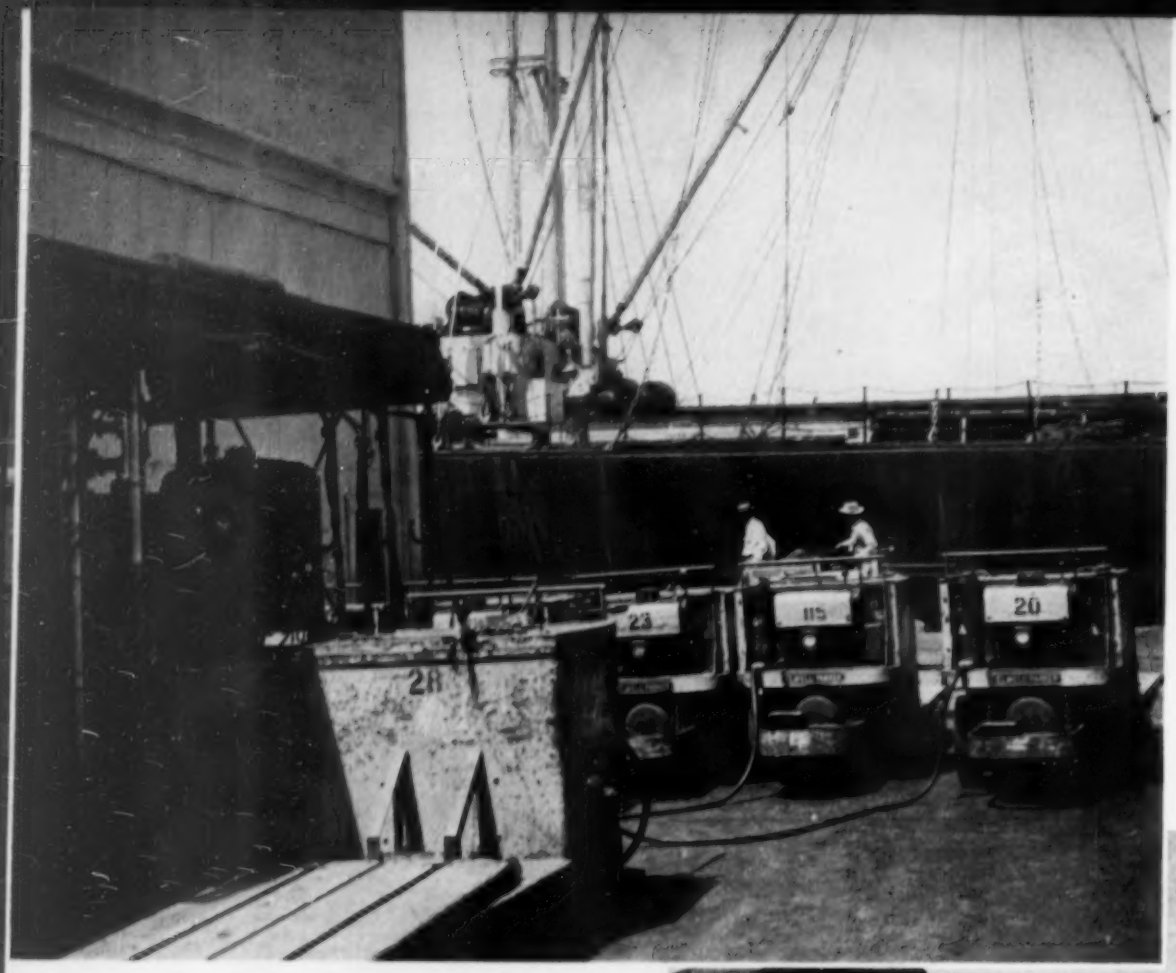
(Photographs courtesy of Watson & Meehan, San Francisco.)



Four-cylinder Cummins diesel with Twin Disc clutch is used by drilling company to power test pump in running new wells.

case was true in the operation shown in the drilling photograph. The rig belongs to the Eaton Drilling Co., Woodland, Calif. (See "Digging Diesels" in DIESEL PROGRESS, January 1955.) The Eatons also have mounted on rubber tires a 4-cylinder Cummins diesel that transmits power through a Twin Disc clutch to test pumps. When the Eatons have driven a new well, they test its capacity with this mobile diesel and are able to determine the size pump needed permanently.

The machine shop of Matson Navigation Co., San Francisco, took a truck of ancient vintage and mounted a diesel generator set on the back platform. This unique unit tours the docks where Mat-



Diesel generator set on back of truck travels to docked ships and charges batteries of "jitneys" used in stevedoring cargo.

son ships are loaded and unloaded. Its job is to keep the batteries charged in Matson's fleet of "jitneys," nickname for the little electric lift trucks that are used, to reduce fire hazards, in moving cargo on and off ships. Sixteen jitneys normally are used in stevedoring a vessel. Matson's mobile generator has eight leads and therefore can charge that many batteries at one time. Half of the jitney operators eat lunch at one time, and the other half 30 minutes later. Thus, each of the 16 storage batteries gets a booster charge at noon. Full charges are given when the jitneys are not employed.

The Basalt Rock Co., Napa, Calif., took two of its oldest Euclid dump trucks and modified them in order to get further work from them as car pushers. Modifications consisted largely of mounting a rugged pusher bar in front, and putting enough ballast back of the cab to assure traction in starting a heavy load such as a gondola of rock or gravel, or a flatcar weighed down with steel pipe.

The writer saw a Kenworth with a rear-dumping, ore-hauling body *discovered* as a "tool" in Fallon, Nev., under circumstances that recalled a story in an old grammer school reader. Do you remember the Chinese boy whose home burned, inadvertently roasting his pet pig? When the flames died down, the sad lad ran to his dear, dead pig and touched it fondly. He burnt his fingers and stuck them in his mouth. To his surprise, the taste was so delicious that he hired a press agent and got the whole world to eating pork. Maybe the ending was different.

We don't know who started the world eating raw oysters, but in Fallon, Nev., we needed an action photograph of the Kenworth ore truck on a day it wasn't scheduled to work. J. N. Tedford, the owner, accomodatingly substituted it for a light, gasoline-powered dump truck that was hauling top soil to a housing development. As the big rig was dumping in close quarters between two new houses, the contractor dashed up in his pickup truck. Using the genteel words characteristic of his hardy breed, he wanted to know if the truck owner had lost his mind. The reason for the one-time use of the big truck was explained. The contractor reluctantly fell in with the plan. As he watched, his attitude changed. "Why use anything else but this big ore wagon?" he asked. "This truck spreads the dirt just like I want it. Won't need a bulldozer and my men won't have any shoveling to do. Let's get this fill work done in a hurry!"

As we said in the beginning, new labor-saving, money-making jobs are being found nearly every day for diesel trucks.

Two "veteran" Euclid rubber-tired tractors were made into car pushers by mechanics of Basalt Rock Co. The engine is a 150 hp Cummins diesel with a Fuller transmission.

Big ore hauler was found to be an effective, time-saving tool in close quarters. Nevada home builder, accustomed to light dump trucks, was converted by chance demonstration.

Originally built in 1897 and expanded in 1942, this building now houses seven diesel engines. Newest, a 4250 hp Nordberg, was installed in 1951.

HUDSON, MASSACHUSETTS

Base Load Engine in 7-Engine Municipal Power Plant Operates 91% of Time; Has Cut Fuel Costs Considerably, Leading City to Order Another Nordberg for Installation This Year

By THOMAS A. WALSH*

SINCE going on the line at the Hudson, Mass., municipal light and power plant in May 1951, a 4250 bhp Nordberg diesel has been operating 91% of the time, working round-the-clock, seven days a week. Throughout this period the engine has never had a forced shutdown due to engine failure, and is guaranteeing a source of continuous, dependable power at low cost.

From the day the 10-cylinder Nordberg went on the line, it has been the Hudson plant's base load unit, generating 75% of the plant's total production in 1952 and 74% in 1953. It is almost never idle, being shut down only once or twice a year for inspection and preventive maintenance. Between May 10, 1951, and December 31, 1953, it was on the line for a total of 21,162 hours out of a possible total of 23,160 hours, generating 45,699,027 kwh.

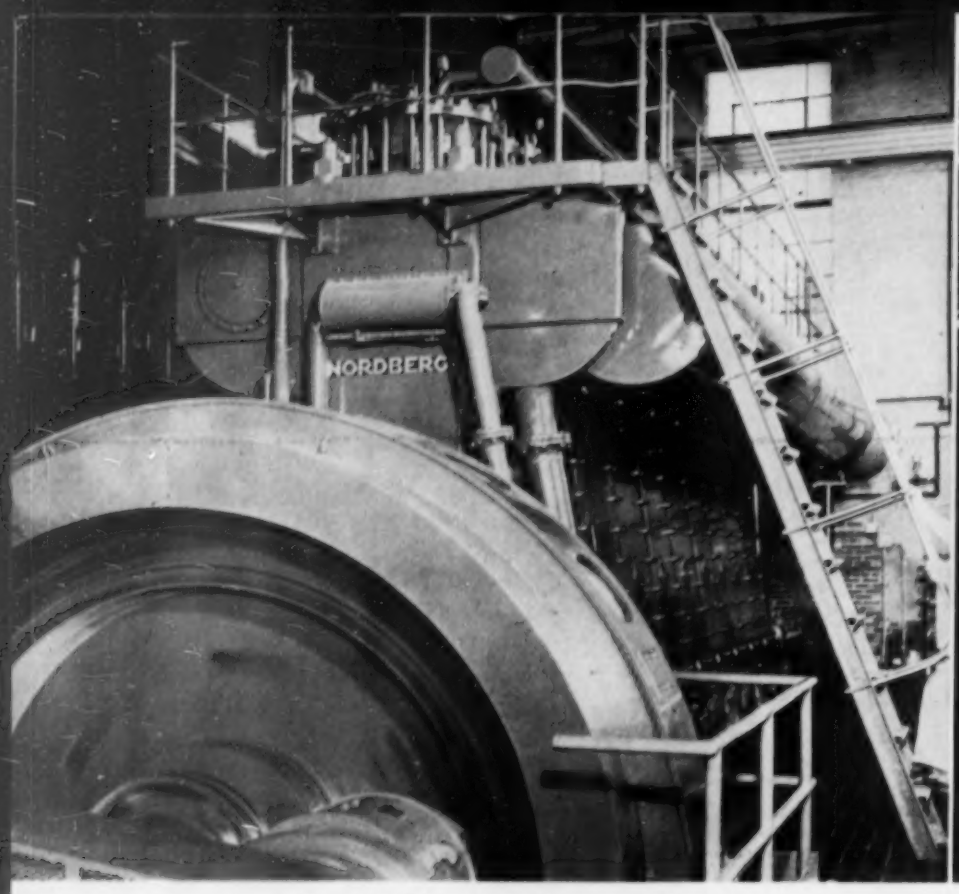
Addition of the 3300 kw Nordberg gave our plant firm capacity in excess of peak load. The other six diesel engines in operation have a combined rating of 5525 kw, as compared with a 1953 peak of 5290 kw. This protection against a possible plant shutdown is particularly important since we provide total or partial power for eight surrounding towns.

In 1953, the two-cycle Nordberg produced 18,072,000 kwh of the plant's total of 24,457,700 kwh. In doing so, it consumed a total of 1,370,383 gallons of fuel oil. This represents an average of 13.19 kwh/gal. of fuel, or 10,465 btu/kwh. The remaining six diesels in the plant, meanwhile, generated a total of 6,385,700 kwh, consuming 540,183 gallons of fuel oil. This represents an average of 11.8 kwh/gal. of fuel. The efficiency of the Nordberg engine was sufficient to raise the plant average for 1953 to 12.8 kwh/gal. of fuel. With fuel oil in Hudson increasing in price during this four-year period from a low of 8.2¢ per gal. to approximately 10.3¢ per gal., the increased fuel economy was instrumental in cutting production costs. Lube consumption also dropped. In 8367 hours of operation during 1953, the Nordberg consumed only 3397 gal. of cylinder lube and 1021 gal. of sump lube oil, representing a total of 4418 gals. or an average of 8059 rated hp/hrs/gal.

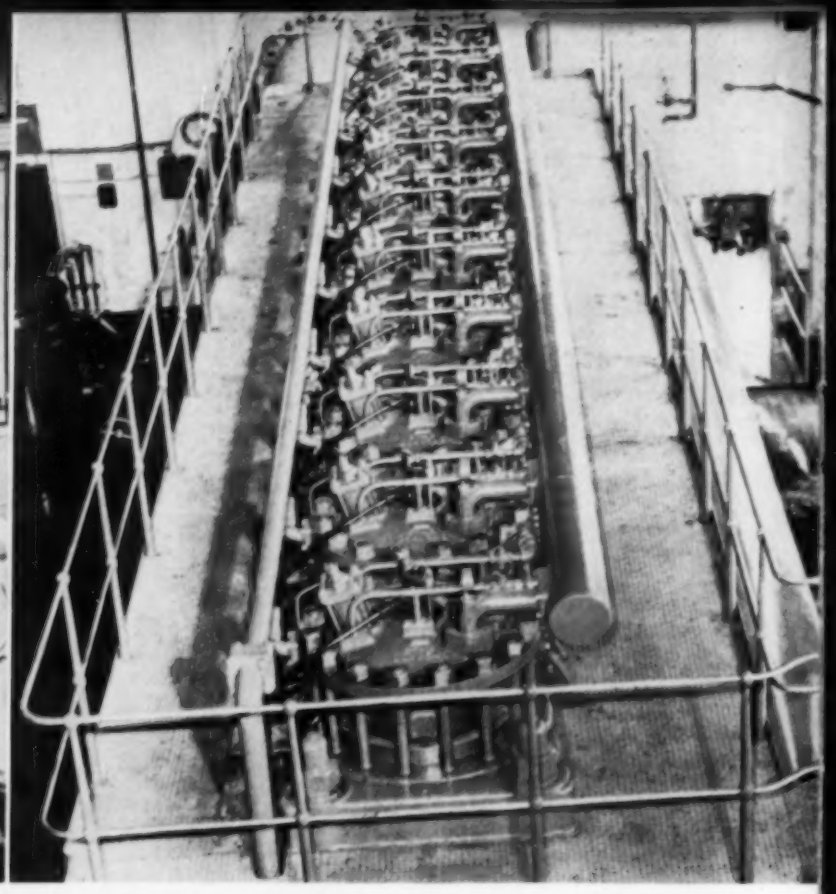
Hudson has a population of about 8000 and is an industrial community. In 1953 the municipal plant's kw/hr sales record was as follows: 7,441,400 kwh to large power consumers having a demand of 500 kw or more; 7,086,557 kwh to residential consumers; 3,214,622 kwh to small power consumers having a demand of 25 kw or more; 2,435,122 kwh for commercial lighting; and 764,859 kwh for street lighting and other municipal purposes.

Hudson has a town meeting system of government, reminiscent of Colonial days. Every person over 21 years of age who has been a resident of the town for one year or more is eligible to vote and is given an opportunity to "have his say" on all legislative matters coming before the meeting. The people themselves enact all laws and levy taxes by a two-

*Manager, Light and Power Dept., Hudson, Mass.



Access plates in Nordberg engine are large enough to permit a man to enter and allow him ample room inside for inspection and maintenance. General Electric supplied generator and exciter.



Upper platform of the Nordberg, showing simplicity of the water-cooled cylinder heads. DeLaval pumps are used for transfer of fuel and lube oil, and as a fuel oil standby booster.

thirds majority vote. It was by such a vote that the town appropriated $20,000 in 1896 to purchase the local Hudson Electric Co., constructing a new steam plant and generating its first municipal power the following year. There were only 22 customers in those days, the principal purpose of the plant being to supply low-cost power for street lighting. Since then, the municipal plant has grown to become the sole source of power for the towns of Hudson and Stow, maintaining 4239 meters.

The original steam plant was not large enough and the town purchased additional power until 1928. This was hardly an economical arrangement, since the steam equipment in service was by then obsolete and since the amount of power purchased was not large enough to secure a low rate. As a result, the townspeople were called upon to make a decision.

Either they would abandon their municipal plant and purchase all power from a private utility, or else they would replace the obsolete steam plant with modern, efficient diesel engines. The decision was overwhelmingly in favor of diesels and continued municipal power. Accordingly, three McIntosh & Seymour air-injection diesel engines were installed in the fall of 1928 and the old steam turbines were removed. One of these three engines, the No. 3 unit, is rated at 675 hp at 225 rpm and drives a 460 kw General Electric generator. The other two are rated at 900 hp at 225 rpm each and drive 615 kw GE generators.

A fourth McIntosh & Seymour diesel was installed in 1932. This was a 1200 hp, 277 rpm, mechanical-injection unit driving an 835 kw GE generator. All four engines are of the four-cycle type and all are still in service. In 1937, the plant added a fifth engine, a 1480 hp, 277 rpm, two-cycle, mechanical-injection Alco-Sulzer diesel, direct-connected to a 1000 kw GE generator. (See DIESEL PROGRESS, December, 1937.) The load continued to increase, however, and to meet the rising demand a 3000 hp, 240 rpm, two-cycle, mechanical-injection Busch-Sulzer diesel engine was added in 1942. Driving a 2000 kw Westinghouse generator, this unit brought the plant's capacity up to 5525 kw and helped carry the spiraling load during World War II. A new addition to the plant had been constructed in 1942 to accomodate the No. 6 engine and the new Nordberg was erected (May, 1951) in the extra space then provided. Having 10 cylinders of 21½ in. bore and 31 in. stroke, the Nordberg is rated at 4250 hp at 225 rpm. It is a two-cycle, mechanical-injection, crosshead-type unit direct-connected to a 4125 kva, 3300 kw, 4160/2400-v., 8 pf., 3-phase, 60 cycle General Electric generator. The 125-v., 320 amp., 1150 rpm GE exciter is driven by v-belts.

No. 2 fuel, with a gravity of 34.9, arrives by truck and is stored in two 20,000 gal. steel storage tanks above ground. Lube oil is stored in two 10,000 gal. steel storage tanks above ground. It is kept at an easy-flowing temperature by circulating warm jacket water through heating coils in the bottom of each tank. Before reaching the lube oil header, the lube passes through a full-flow strainer and through a Nordberg magnetic strainer, equipped with two permanent magnets. To keep the lube oil in top condition, it is pumped continuously from the sump tank and run through a fuller's earth filter. It is then returned to the sump. Cooling is accomplished by circulating the lube oil through a vertical, shell-and-tube cooler, equipped with an automatic, thermostatically controlled by-pass valve.

Scavenging air is supplied by a 20,600 cfm, motor-driven centrifugal blower. Air enters the blower through a self-cleaning, oil-bath type filter at a pressure of 14.6 psi abs. and is discharged to the cylinders at a pressure of 17.5 psi abs. A 350 hp electric motor drives the impellers. Starting air at 350 lbs. pressure is stored in two bottles serving the Nordberg engine. These bottles are supplied either by engine-driven compressors on the plant's three air-injection diesels or by a compressor installed in the basement, driven by a gasoline engine or by an electric motor.

A control panel includes an exhaust pyrometer, pressure gauges on jacket water, lube oil, fuel oil, and starting air, plus audible and visual alarms on jacket water pressure and temperature, fuel oil high level and low level, blower motor load and lube oil pressure and temperature. Two switchboards handle the 4160 volt and 2400 volt circuits. The nine panel, 4160 volt board is of the dead-front type and is equipped with a swinging sychroscope. Its solenoid-operated switchgear is located on the plant's mezzanine, which runs the entire length of the building on one side.

The Hudson plant is a thriving utility, maintaining rates which are lower than utilities in the area and comparable to the low rates of good municipal plants in our section of the country. Since the Nordberg engine was installed, the plant has increased its annual production volume by more than 42.7% from a total of 17,131,300 kwh in 1950 to 24,457,700 kwh in 1953. By 1964, this production is expected to reach 48,000,000 kwh per year. Proof of this engine's efficiency is found in the fact that our city recently purchased another Nordberg diesel for installation in 1955. This unit, rated 5100 bhp, will operate at 240 rpm, 75 BMEP.

Residential rates that dip from five to one cent per kwh have resulted in the overwhelming popularity of electric ranges among the town's housewives. In Boston, Mass., approximately 25 miles away,

List of Equipment

Engine—Nordberg 4250 hp, 225 rpm, 10 cyl., crosshead type, 21½x31 in.

Generator and exciter—General Electric 4125 kva, 3300 kw, 225 rpm, 4160/2400-v., 3-phase, 60 cycle alternator.

Governor—Woodward.

Fuel oil—No. 2 H. N. Hartwell.

Fuel oil meters—Exacto.

Fuel oil duplex filters—Nugent.

Fuel oil transfer and standby booster pump—De-Laval Steam Turbine.

Fuel injection pumps—American Bosch.

Lube oil—Ray Oil Co.

Lube oil filter—U.S. Hoffman.

Lube oil filter pump—Haight.

Lube oil transfer pumps—DeLaval Steam Turbine.

Full-flow oil strainer—Nordberg.

Lube oil cooler—Struthers-Wells.

Power cylinder lubricators—Manzel.

Jacket water pump—Allis-Chalmers.

Jacket water heat exchanger—Struthers-Wells.

Thermostatic control valves—Fulton Sylphon.

Raw water pump—Allis-Chalmers.

Scavenging air blower—Elliott.

Air filter—American Air Filter.

Air compressors (emergency)—Worthington.

Exhaust silencers—Maxim.

Exhaust pyrometer—Alnor.

Control panel—Nordberg.

Pressure gauges—Lonergan.

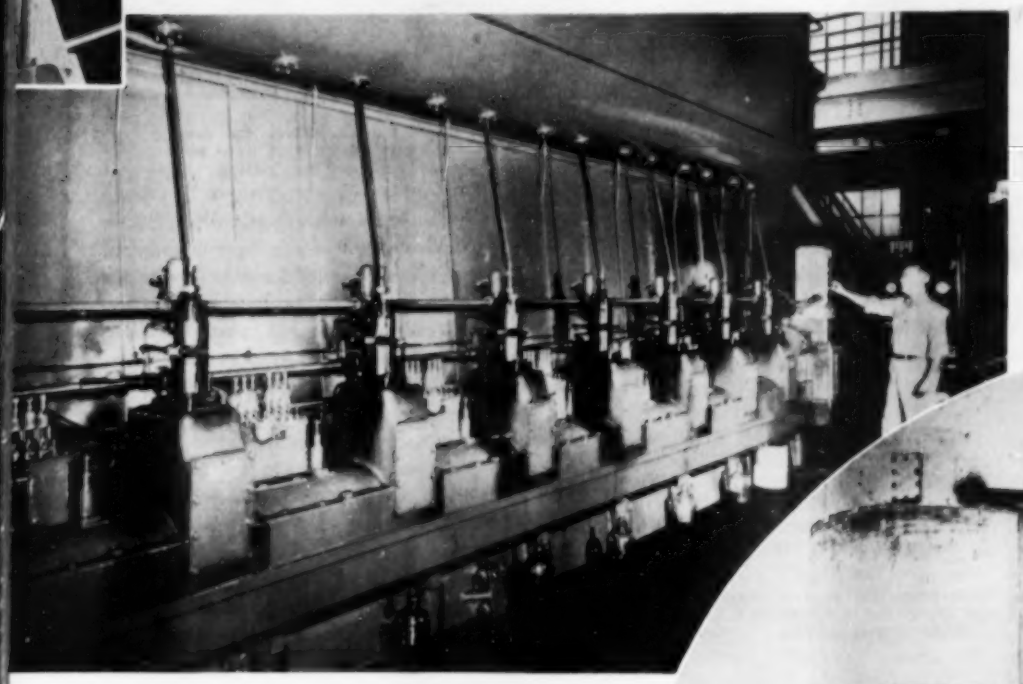
Alarms—Viking Instrument.

Meters and switches—General Electric.

Switchboards—G & N Engineering.

Municipal Light And Power Dept.
Hudson, Massachusetts
TABLE I

MONTH	KW. HRS GEN. PLANT 1950	KW. HRS GEN. PLANT 1953	KW. HRS GEN. NORD. 1953	FUEL CONSUMPTION (Kwh/Gal.) PLANT 1950	FUEL CONSUMPTION (Kwh/Gal.) PLANT 1953	FUEL CONSUMPTION (Kwh/Gal.) NORD. 1953
Jan.	1,461,600	2,196,700	1,661,000	12.27	12.82	13.09
Feb.	1,316,700	2,012,300	1,518,100	12.22	13.01	13.60
Mar.	1,462,900	2,151,800	1,689,100	12.56	13.06	13.40
April	1,286,000	2,024,900	1,604,000	12.36	13.06	13.19
May	1,330,000	1,909,700	1,053,800	12.37	12.81	13.21
June	1,290,600	1,805,700	1,465,000	12.33	12.79	13.18
July	1,219,800	1,736,600	1,456,000	12.10	12.65	12.99
Aug	1,444,100	2,019,300	1,550,200	12.23	12.57	13.03
Sept.	1,455,400	2,048,000	1,531,800	12.41	12.51	13.15
Oct.	1,606,800	2,204,900	1,598,000	12.44	12.73	13.17
Nov.	1,592,000	2,084,900	1,513,100	12.37	12.81	13.12
Dec.	1,665,400	2,263,700	1,431,900	12.33	12.81	13.18
Total	17,131,300	24,457,700	18,072,000	12.36	12.80	13.19

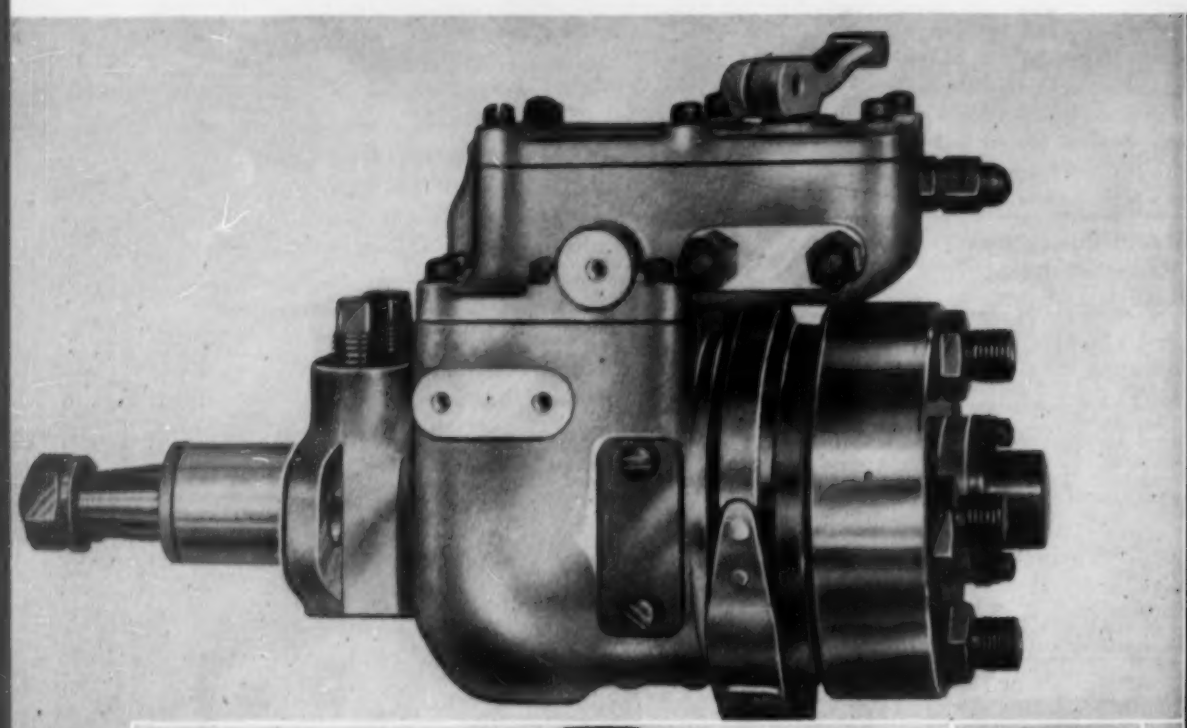


W. L. Allen, plant supt., is seen at the Woodward governor. Cylinder lubricators are by Manzel, and the fuel injection pumps are Bosch.

A Maxim exhaust silencer and an American Air intake filter serve the 10-cylinder Nordberg at Hudson.

gas stoves far outnumber electric ranges. In Hudson, however, the opposite is true. In spite of its low rate structure, the Hudson Light and Power Department conducts a sound and profitable business. In 1953, the department reported a total income of $573,709.81 and total expenditures of $405,889.76, leaving an operating profit of $167,820.05. After allowance of $95,038.20 for depreciation reserve and $2,755.62 for interest, clear net profit was $70,026.23. This money eventually finds its way back into the pockets of the local citizens by reducing municipal costs and taxation.

William L. Gibbons, Victor A. Janusis and Robert McCarthy are the Commissioners of Public Works and Willard L. Allen is plant superintendent. The writer has been manager of the Light and Power Department since 1937. Credit must be shared by all the citizens who gather in public meeting to support sound management and vote the purchase of good equipment.



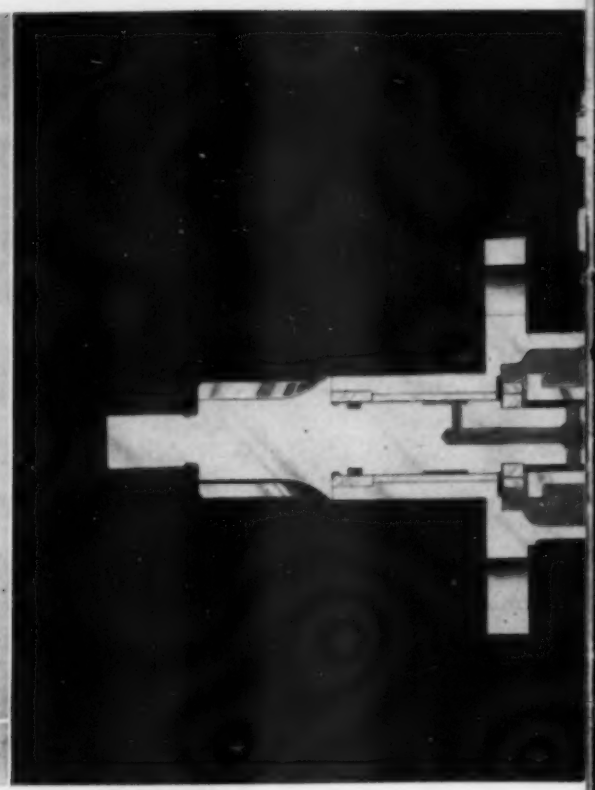


Fig. 1, left above, shows the new camshaft-speed pump with governor, supply pump and fixed timing.

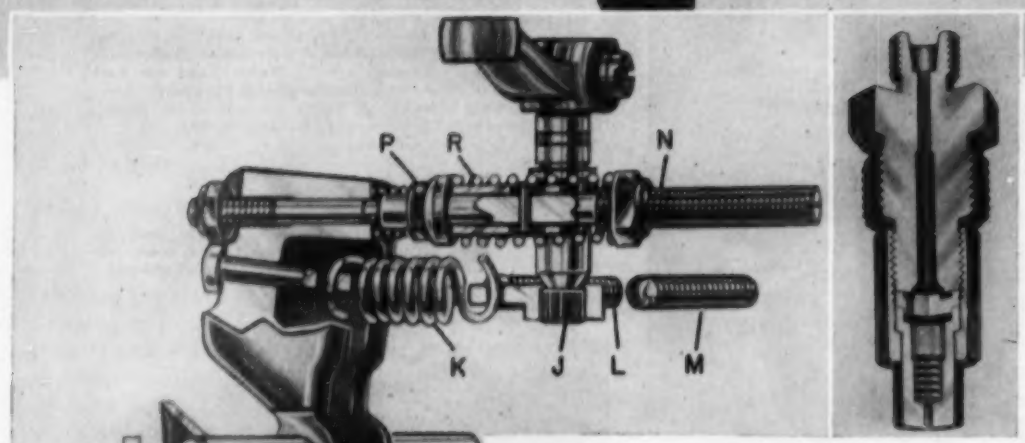
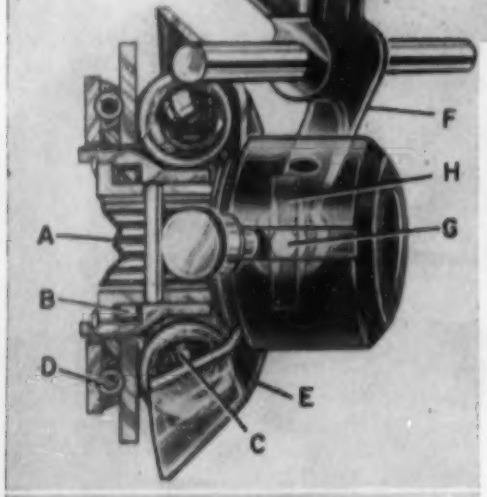


Fig. 4—Cross-section of new type screw-in holder and outwardly opening poppet nozzle.

Fig. 5—Governor used is of the simple ball and single-cone type, described in detail on opposite page.



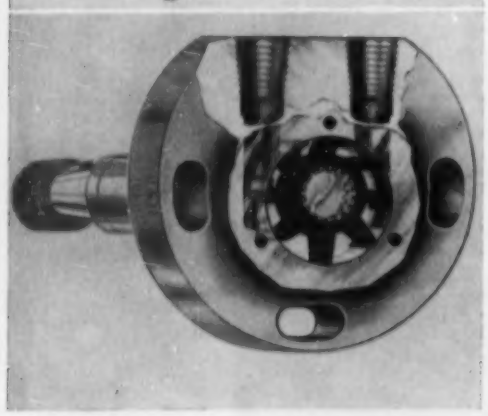


Fig. 6—Fuel supply pump which is mounted on forward end of pump housing.

NEW BOSCH PDA FUEL PUMP

By S. E. MILLER

and T. D. HESS*

**Excerpts from a paper read before SAE Golden Anniversary Meeting, Detroit, Mich., January 10, 1955.*

WITH development and usage of the small high-speed diesel engine in this country, there has come increasing need for reduction in the cost of fuel injection equipment. In Europe, where the economic incentive for the diesel is much greater on account of higher fuel costs, small engines are likely to be diesels anyway; but over here the choice between gasoline, LPG and diesel prime movers of small size is appreciably affected by their initial purchase costs and thus by the differential costs of the accessories, among which the injection pump is the biggest item.

The use of a single fuel-pumping element serving all cylinders of a diesel engine by means of a suitable fuel distributor was one of the earliest concepts of a fuel injection pump. American Bosch has been keenly aware of the need for lower cost, smaller, simpler, and more flexible injection systems for diesel engines. Continual development of distributor-type injection pumps has therefore been carried on intensively since 1939.

The PDA pump development which is the subject of this paper has been essentially an effort to retain the sound injection characteristic of the PSB through adherence to the same fundamentals while adding new features and altering radically the size, shape and form of the pump to match the further development of small engines. Several years of development work have been required to achieve satisfactory solutions to all of the problems of a design to include economically: (a) spill metering; (b) automatic, manual, or fixed timing; (c) flange, base, or shank mounting; (d) 100% excess fuel for starting; (e) torque-control governing; (f) adaptability to 8-cylinder engines. The PDA pump is a new camshaft-speed pump incorporating all of the above features. In order that the metering principle may be clearly understood, the basic pump with

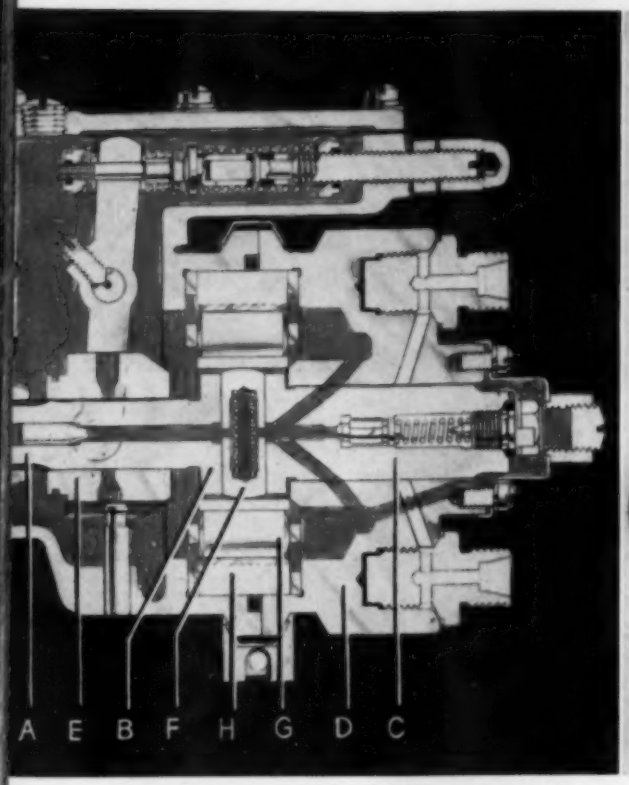


Fig. 2, above, shows new pump in cross-section with some parts deleted so metering process, described below can be followed.

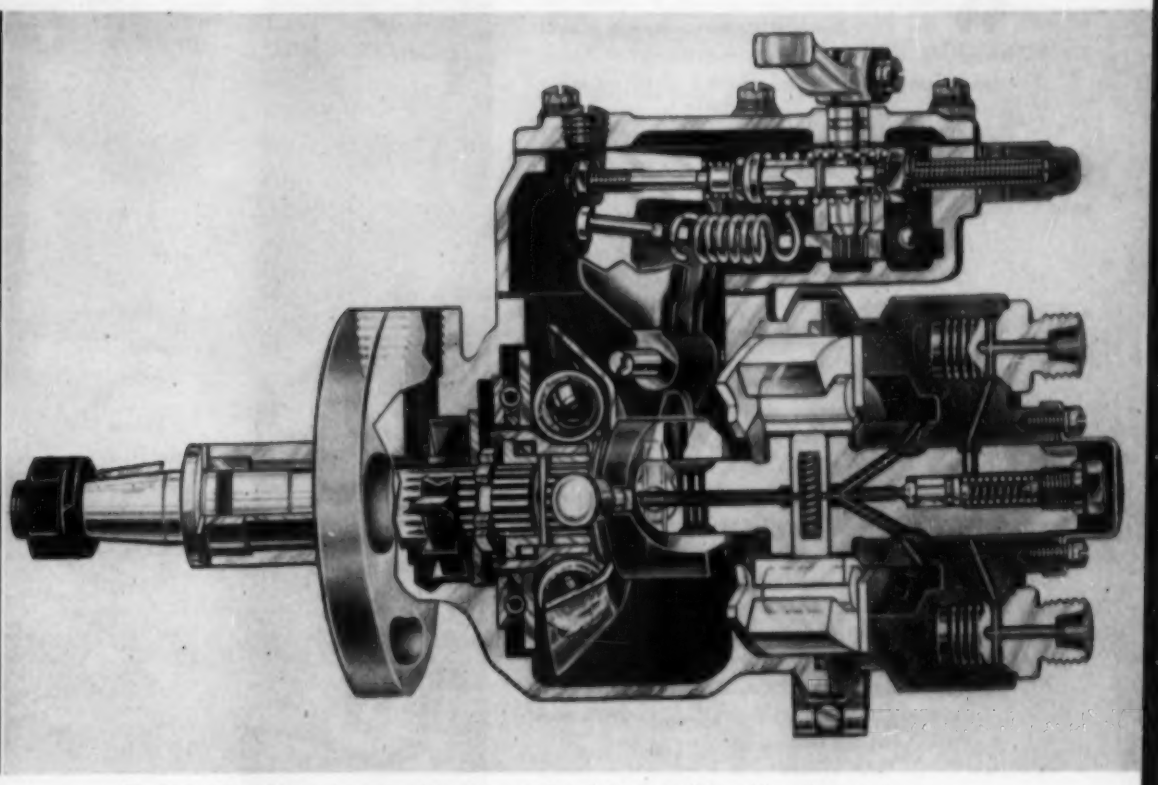


Fig. 3. At this point in the cycle, the rotor metering slot is in registry with a sleeve port which permits the fuel to spill back into the sump during initial plunger acceleration.

governor, supply pump and fixed timing as shown in Fig. 1, will be first described.

In the pump cross section shown in Fig. 2, some of the governor parts and the supply pump have been deleted in order that the metering process may be more easily followed. The entire pump is filled with fuel, which is delivered from the final stage filter at a pressure of 5 to 10 psi and which serves to supply the engine's requirements as well as to lubricate all moving parts of the pump. A rotor shaft comprised of a metering section (A), a pumping section (B), and a distributing section (C), rotates within a distributing head (D). A control sleeve (E), fitted to the metering section, controls the metering and injection timing of the pump. The plungers (F), with their shoes and rollers (G), all turning with the rotor shaft, are forced into reciprocating motion by a symmetrical internal cam (H).

Fig. 2 shows the beginning of the filling stroke as the plungers start to move apart. The fill ports are open the entire time of the plunger filling stroke, which allows the use of very low supply pressures. Indeed, a gravity head of a few inches of fuel is ordinarily enough to insure complete filling. As the plungers reach the end of the filling stroke, the fill ports close, and with further shaft rotation the plungers start moving toward each other to begin the injection stroke. At this point in the cycle (Fig. 3) a rotor metering slot is in registry with a sleeve port which permits the fuel to spill back into the sump during the initial plunger acceleration.

The governor used is of the simple ball and single-cone type as shown in Fig. 5. In this design, the governor cone is carried directly on the metering sleeve, thus eliminating any connecting linkages between the governing element and the metering element. The governor is driven from the pump drive shaft through splined members (A), which in turn drives the ball cage through a shock absorbing member (B), which isolates engine torsional vibration. Six balls (C), driven by the ball cage, bear against the thrust bearing (D) and the cone (E), forcing the cone and the integrally mounted metering sleeve to the right with speed increase. The fulcrum lever (F) cooperates with the sleeve by means of a pin (G) confined by a slot (H) in the metering sleeve. The outward end of the fulcrum lever carries the governor tension spring (K) connecting with the manual operating shaft (J).

The governor is shown in the idling position with the spring carrier bearing against the idle screw (L), with the high speed stop screw adjustment (M) just to the right. The full load fuel adjustment screw (N) carries the spring capsule (R) which provides automatic 100% excess fuel delivery for starting when the manual operating shaft is in full speed position. This excess starting fuel control is set to operate only in the speed range of 0 to 500 rpm, and excess fuel cannot be provided at higher speeds. The spring loaded pin (P) in the fulcrum lever (F) provides automatic torque control through the full load speed range. An axial movement of the sleeve provides continuous metering of the fuel and that angular movement of the sleeve provides a continuous change in injection timing without affecting the metering function.

The basic PDA pump has fixed injection timing accomplished by the installation of a fixed pin which prevents any angular movement of the metering sleeve. Automatic timing also may be provided by using engine intake manifold air speed sampled by a small venturi connected to a diaphram operator which is linked to the injection timing lever and movable pin. Since the force necessary to rotate the metering sleeve to effect a change in injection timing is only the friction force of the lapped sleeve on the rotating shaft, very small pressure differences are required to insure proper functioning. Entirely obviated is the need to vary timing by interposing in the pump's drive a mechanism powerful enough to oppose the driving force.

The fuel supply pump is mounted in the forward end of the pump housing and consists of a simple flexible vane impeller enclosed by an eccentric bore. It is reversible and self-regulating, and is mounted directly on the pump drive shaft. An enlarged view of the supply pump is shown in Fig. 6. The pump is continuously vented through a small non-return valve to the top of the fuel tank. This type of system is gaining wide favor because of its very beneficial effect upon filter life since only the fuel delivered to the nozzles, plus the small bleed flow, is required to pass through the filters.

The injection pump can be used with a new type screw-in holder making use of an outwardly opening poppet nozzle which requires no leak-off. A cross section of this nozzle and holder is shown in Fig. 4. The use of the screw-in type of holder with this ADE nozzle can in itself make an important contribution to the reduction in cost of fuel injection systems.

The PDA pump has been designed for conventional flange mounting in the manner of the multi-element APE pump, and for shank mounting in the manner of an ignition distributor. To permit a higher degree of standardization between engine models, this second execution can be provided with adapter flanges of any normal configuration to which it may be bolted for interchangeability with flange, base or barrel mountings already in use.

The PDA pump, in its initial or "A" size, is being recommended for applications requiring up to 130 cu. mm. of fuel per stroke. Its speed limitations have not yet been determined, being well above the needs of existing engines.

FERRY "EVERGREEN STATE"

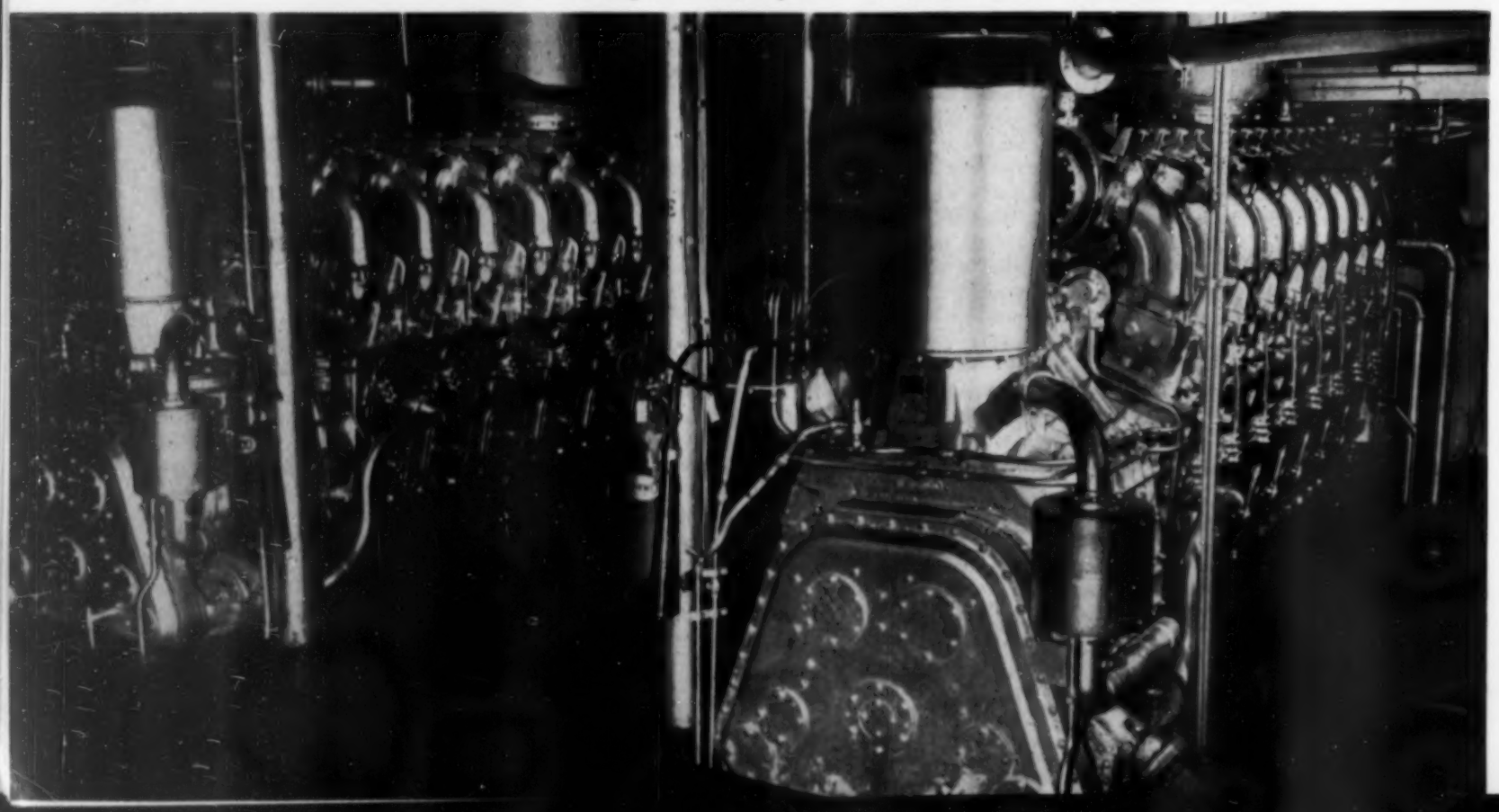
WASHINGTON State Ferries, a division of the Toll Bridge Authority, recently placed in service in Puget Sound the *Evergreen State*, largest ferry built in the United States in more than seven years. Her length is 310 ft., beam, over guards, 73 ft., and her shaft horsepower at 15 knots is 2250 hp. She has a capacity of 100 automobiles, 600 seated passengers, plus 600 others. Her beauty is natural, for she has flowing lines without artificial effort to achieve streamlining.

The diesel-electric drive ferry is a double-ended boat that started working the busy Seattle-Winslow run in November 1954. Brain-child of the well-known W. C. Nickum & Sons firm of naval architects, the new ferry has a family relationship with the *Chinook* and the *Kalakala*, the other large, modern vessels in the state's fleet. These three high-clearance ferries provide cross-country truckers, with the largest legal-limit rigs, easy access to various Olympia Peninsula points.

The *Evergreen State* was built in the Seattle yard of Puget Sound Bridge and Dredging Co. The winning bid of $1,639,173 was slightly lower than that of the Moore Drydock Co., Oakland. The new ferry's power plant is almost identical to that of the *Chinook*, both having been lifted from little-used U. S. Navy corvettes as surplus equipment. However, in the case of the *Chinook*, a single-ender, four General Motors Cleveland Diesels are employed to drive a pair of twin-motor, twin-screw, geared electric propulsion units. In the slower, double-ended *Evergreen State*, only two of these Cleveland Diesels are used. They are power geared, twin-motor drives, located in opposite ends of the engine room and each connected to a propeller. The two GM diesels left over from the corvette that gave the new ferry her power plant will serve as spares for the *Evergreen State* and *Chinook* if the need arises.

The Model 16-278A main engines have 16 cylinders and are rated at 1675 hp. Each engine drives a 1200 kw Allis-Chalmers generator. Ultimate propulsion is produced by a unit at each end of the vessel which consists of twin 1500 hp Westinghouse dc motors. They drive through one double-pinion Westinghouse 3.341:1 reduction gear via a short shaft to the 10-ft. 6-in. Coolidge propellers. Depending on which direction the boat is travel-

New ferry's diesel-electric drive is initiated by two 16-cylinder Cleveland Diesels with Marquette governors. They power 1200 kw Allis-Chalmers generators which in turn drive twin Westinghouse motors, one pair in each end of double-ended vessel.



By CHAS. F. A. MANN

ing, 10% of the electric power output is fed to the forward wheel and 90% to the aft wheel. Thus, the forward wheel is floating at all times and there is no drag. Either diesel, or either motor, can be used under reduced power operation by a disconnect switch. This assures the operators of getting the vessel into port under almost all conditions of mechanical or electrical trouble.

The extreme beam of the *Evergreen State* permits seven lanes of automobiles. The three center lanes are located between slender engine casings and give drivers a straight path on or off the ferry. The outboard lanes have a minimum of curvature. Clearance between auto lanes is 30 in., making it easy to get in and out of cars. Two lanes can load or disembark at one time.

The passage between Seattle and Bainbridge Island is often rough. Therefore, to meet sea and wind conditions, and to allow safe maneuvering at slow speeds in close quarters, it was deemed wise to install a high-speed, heavy-duty rudder system. The one used permits "hard over to hard over" in 15 seconds. By using the bow rudder when docking at slow speeds, the big ferry can be handled easily, even when heavily loaded. The steering system consists of a Vickers variable displacement hydraulic pump with a standard Sperry electric control circuit.

C. Kirk Hillman, Seattle, designed and manufactured the special propulsion controls. Control is accomplished by a modification of the Ward Leonard system. Two auxiliary General Motors 8-cylinder diesels drive Westinghouse 440-v ac generators. They have regular marine type transformers and supply 230-v for other circuits.

Washington State Ferries operates on Shell Oil products from squirt cans to lube and fuel oil. Before the surplus machinery was installed, it was overhauled at which time filters made by Engine Life Products Corp. were utilized. There are six filters—one each on the four GMC diesels and one filter for each gear set.

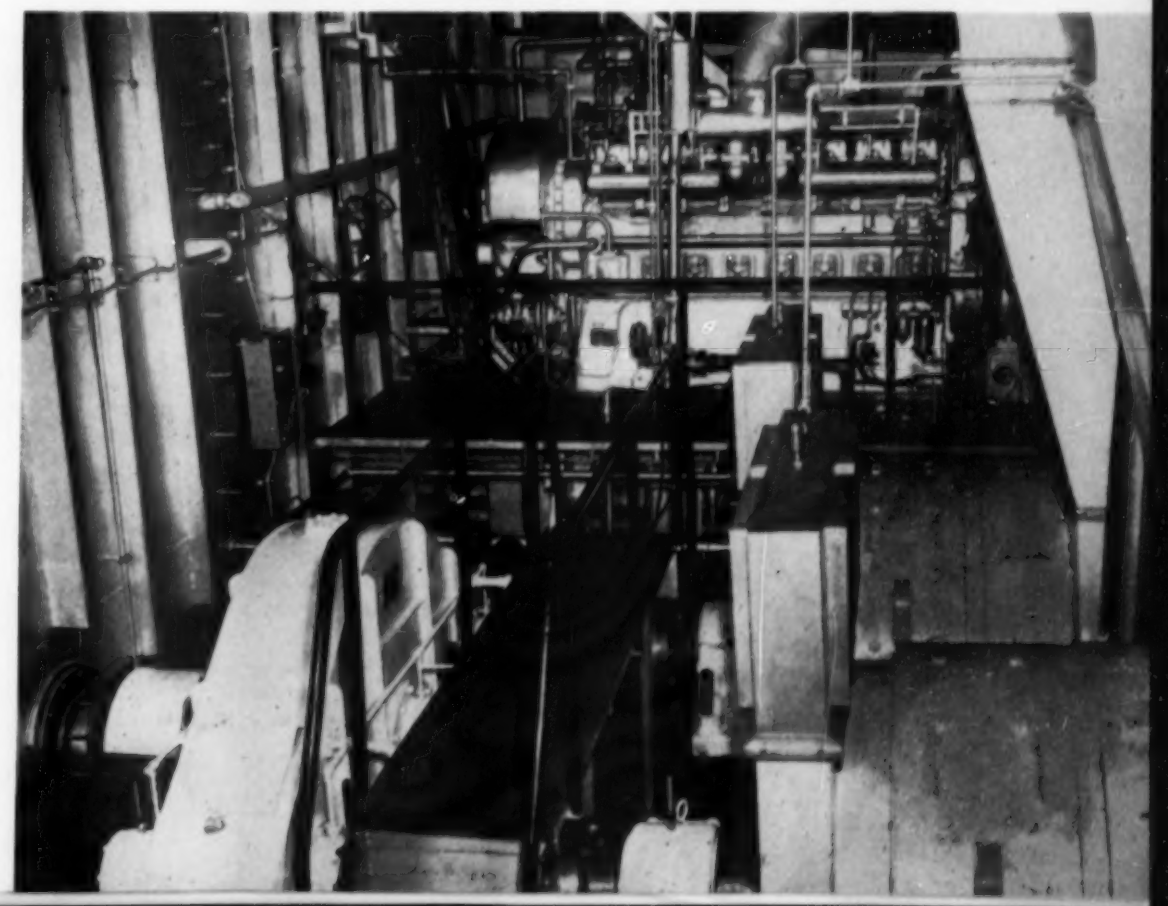
Puget Sound is definitely the "last stand" in North America for the long-distance ferry boat industry.

Nevertheless, Washington State Ferries management is confident of the future. Not only was more than a million and a half spent on the *Evergreen State*, but, last year, two ex-Chesapeake Bay ferries, no longer needed because of bridges, were inducted into Puget Sound service. These additions bring the state's fleet up to a total of 21 ferries.

Principal Dimensions

Length	310 ft. 2 in.
Beam, over guard	73 ft. 2 in.
Beam, waterline, at 15 ft. draft	53 ft. 6 in.
Car deck clearance	15 ft. 2 in.
Automobile capacity, 7 lanes	100 cars
Passenger capacity, seated	600
Passengers maximum	1200
Fuel oil	30,961 gallons
Fresh water	5086 gallons
Lube oil, fresh	1000 gallons
Displacement at 15 ft. draft, long tons	2022
Operating speed	14 knots
Shaft hp	1630 at 14 knots, 2250 at 15 knots
Propeller speed,	159 rpm at 14 knots, 171 rpm at 15 knots.

In background is one of two 8-cylinder GMC diesels which provide ship's service current. Each drives a 440-v ac Westinghouse generator. When machinery was overhauled before installation, six Engine Life Products filters were utilized. Propulsion motors show in foreground.



The compact diesel installation was placed in an existing garage, behind steam plant whose capacity was exceeded by city's growth.

G.E. provided the generator and exciter; Burgess-Manning the silencer; Quincy the compressor; Woodward the governor; Bosch the injection system.

QUAKERTOWN, PA.

Municipal Plant Successfully Combines Old Steam Unit with New Baldwin-Lima-Hamilton Diesel

By RALPH L. YANISH*

AFTER more than 60 years of using steam for electric power generation, Quakertown, Pa., recently selected a diesel-electric unit as the most economical solution to its need for additional generating capacity in the municipal power plant. Like other municipal governments, Quakertown has a limited borrowing capacity. Improvements to the sewage plant had already absorbed this capacity. Therefore, additions to the power plant had to be financed out of operating profits. A careful study indicated diesel operation. Once this decision was reached, a Baldwin-Lima-Hamilton Model 608-SC medium-speed, supercharged engine was purchased. It is rated 1560 bhp. at 600 rpm. It is an 8-cylinder, 4-cycle, 12¾x15½-in., 130.5 psi. bmep. engine. This was selected for the job because it would fill the requirements of maximum economy, performance and dependability. Originally erected in 1892, the present steam plant consists of three 250 psi., stoker-fired boilers rated at 23,000, 30,000 and 40,000 lbs. per hour, which supply steam for three 2400-volt, 3-phase, 60-cycle turbine generators of 1000, 2000 and 3000 kw. capacity. Turbine steam rate is about 12.3 lbs. per kw/hr., and plant peak load is 3300 kw. On the basis of past load growth and monthly output of 1¼ million kw/hr., it was estimated that the system load would continue to show a yearly increase of 10%. Quakertown officials were aided in solving the problem by a thorough study of the situation made in collaboration with Klauder Associates as consultants. To provide a complete picture for the Public Utility Committee of Council, we considered three possible choices: (1.) Install a new 60,000 lbs. per hour boiler and 5000 kw. turbine generator. (2.) Purchase the additional power needed from a private utility. (3) Install a diesel generator set and use it for peak and stand-by services.

The author, Ralph L. Yanish, is Borough Manager, Quakertown, Pa.

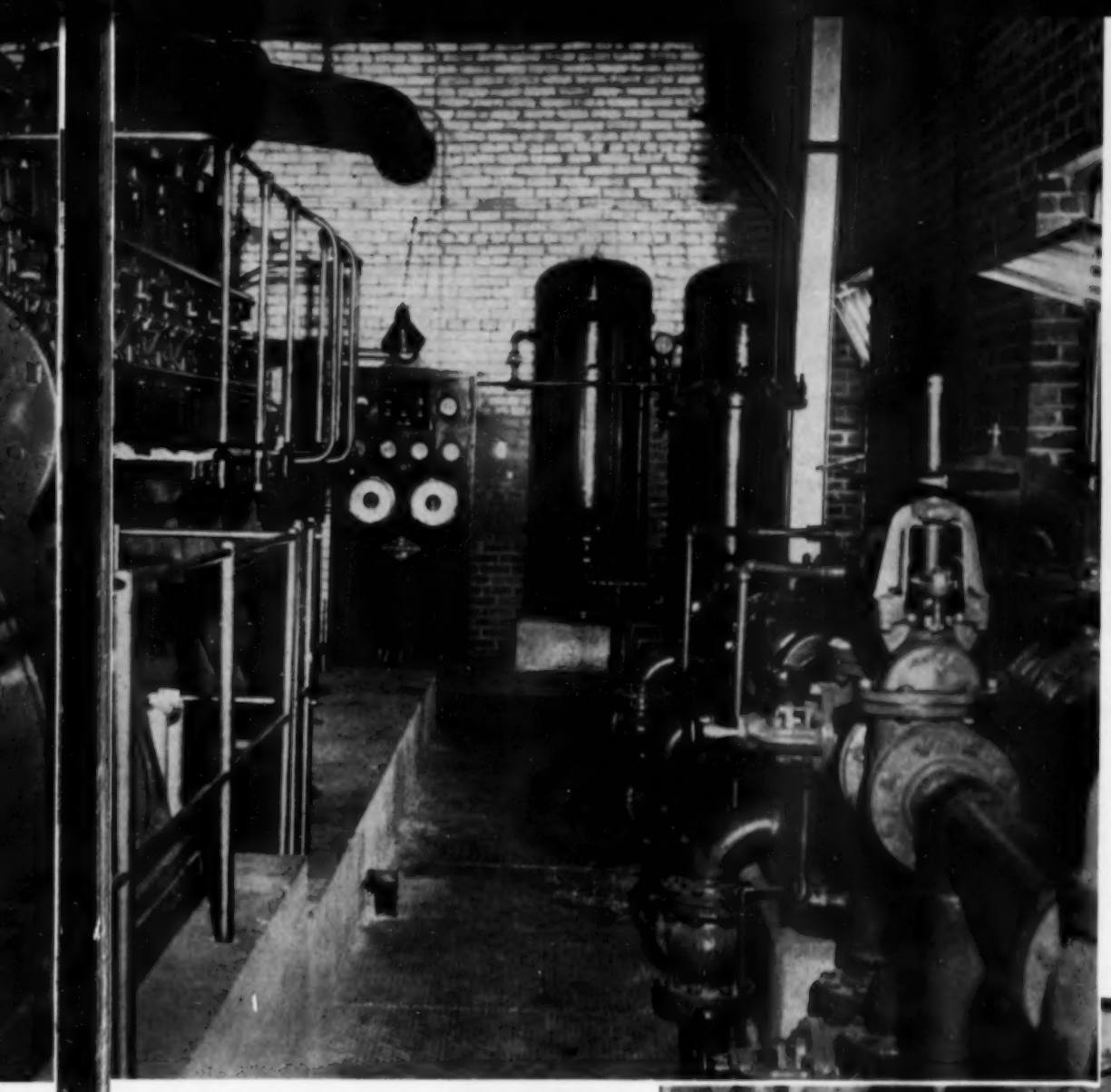
Taking them in the order named, it was found that a new boiler and stoker would cost $200,000. Necessary building extension and changes in coal and ash handling equipment, draft fans and contingencies would require an additional $150,000. As an alternate, the new boiler could replace one of the old ones, but the auxiliaries would still make the total cost $275,000. As a supplementary measure during boiler installation, the Borough would be forced to contract for at least 1500 kw. in standby power from a private utility. This would cost about $30,000 per year over a period of 18 months, or a total of $45,000. Added to the initial $275,000 brings the estimated cost to $320,000.

Such a boiler, if installed, preferably should be a high pressure unit to secure the added efficiency. If so, it also would be desirable to modernize the auxiliary equipment for high pressure operation, with the resultant expenditure of $30,000. Consequently, a new boiler of adequate size and auxiliary equipment would cost between $350,000 and $400,000. Going to the higher operating pressure would necessitate, for highest efficiency, the replacement of the 1000 kw. turbine generator with one of 5000 kw. capacity, an additional expenditure of at least $300,000. This did not take into consideration the additional cooling capacity, which was needed even then, at a probable cost of $100,000. The chief advantage of this plan would be savings in operating costs, estimation of which might be in the neighborhood of 25%. Aside from the costs involved, the main disadvantage of the plan was that deliveries on steam and electrical equipment could not be expected much quicker than two years.

To purchase the needed extra power from a private utility involved spending $20,000 for 400 kw. service, or $40,000 for 1500 kw. service. A contract for 400 to 500 kw. in firm power would make it cost 1.9 cents per kw/hr. If the contract was for 400 kw. stand-by without use, the charge would be $1600

Council that a diesel generator would be the best selection. Going a step further, specifications were prepared which provided that quotations be sought on either a new unit or a rebuilt engine, not having been operated over 7500 hrs. After a study of building costs, it was decided that the new diesel unit could be installed in a part of the existing garage adjacent to the power plant. Another advantage of this location was that operating supervision could be facilitated by installing the generator switchboard and alarm panel in the main turbine room. Thus, generator loading could be controlled from this point, and the shift operator could keep a close watch on the diesel's operation.

After due consideration of the various engines offered, Quakertown officials selected a new Baldwin supercharged diesel generator set as the one that offered the most promising results. It is a medium-speed machine, therefore, noise will be no problem. Furthermore, this type engine is exceptionally economical in its use of both fuel and lube oil. Operating performance in railroad service shows 8% more miles traveled per gallon of fuel, and a reduction of 33⅓% in the consumption of lube oil. The installation includes a closed cooling system in which steam condensate is used for make-up. A recirculating system between shell-and-tube



Mr. Yanish inspecting the B-L-H diesel-electric set with William Lawlor, plant superintendent. Note the Elliott supercharger and the Purolator lube oil strainer.

a month or over $19,000 a year. If a contract were let for 1000 kw. in firm power, the difference between the cost of Quakertown generation and charges billed by the power company would exceed $30,000, much more than would be needed to amortize a diesel generator set. Another contributing factor against this solution was the reluctance of most of the citizens and councilmen to depart from the policy of operating as an independent producer.

A diesel unit offered the exceptional advantage of being considerably lower in first cost than steam equipment, while its operating costs would be about the same. Also in its favor is its availability —ready for service on a moment's notice, which makes it especially adaptable for peak and stand-by services. Estimates from manufacturers indicated that a new diesel generator set of 1000 kw. capacity would cost in the neighborhood of $200,000, which would include all auxiliaries.

Summarizing the various possibilities, the first, involving steam equipment was discarded because of the high initial cost; it would involve the expenditure of from $750,000 to $1,000,000. Over-all operating costs would be more favorable under this plan, but there was no possibility whatsoever of financing such an investment. The second, which proposed the purchase of power from a private utility, was discarded because of the high rate charged for the energy. It was then decided by

A trial run of the B-L-H engine was observed by Plant Supt. Lawlor; W. A. Kellow, sales engineer; Quakertown Council members Clifford Kile, Charles Knapp and Russell Boorse; and Michael McAdam, assistant superintendent.

heat exchangers and a spray pond carries away the heat from cylinder jackets and lubricating oil system. Fuel is Socony Vacuum #2 diesel oil; lube oil, also a product of Socony Vacuum.

Put into operation in June of 1954, the diesel has met every expectation. It is giving a good account of itself in economy of fuel and lube oil consumption, and availability. While the Baldwin diesel has not been in operation long enough to provide all the answers to comparative costs of operation, our records show interesting results. Operating at slightly more than 50% capacity, the unit logged 280,000 kw/hr. as of September 9, 1954 on the consumption of 22,770 gallons of fuel oil. Considering the fact that, until the engine is well broken in, it is using premium cost fuel oil at $.1006 per gallon and lube oil at $.66 per gallon, fuel and lube oil costs have averaged only 8.3 mills per kw/hr. This undoubtedly will be lower when a heavier and cheaper fuel is used and the diesel is operated at full load. (Maximum to date is 700 against a 1200 kw. capacity.) This compares with a coal cost which varies from about 8.0 to 8.8 mills per kw/hr. weekdays depending upon what boiler and generator combinations are in use. Weekend fuel costs prior to using the diesel ranged from 9.0 to 9.5 mills per kw/hr. depending upon the load.

The table shows comparative costs on both weekdays and weekends. Previous to installing the diesel, it was necessary to operate two boilers at all times, chiefly because load requirements during the week slightly exceeded the capacity of the 40,000 lb. per hour boiler. Inasmuch as it was not practical to take a boiler out of service over a weekend, both boilers remained in service seven days a week. An examination of the table shows that savings with the diesel are possible under any practical equipment combination. These savings vary from $22 to almost $70 a day during the week, and from $128 to $160 over a weekend. The figures stress the dollar savings obtained by supplementing steam apparatus with the diesel unit, although it was initially installed primarily for the additional capacity to meet winter peak loads.

As an alternative to this, one of the initial investigations considered the purchase of 400 kw. in firm power from a private utility at a cost of almost 1.9¢ per kw/hr., or 400 kw. stand-by at $1600 per month, plus energy costs. An actual comparison between these two plans is difficult because the diesel provides 1200 kw. stand-by as against 400 kw. with the power company. However, since no additional labor costs or diesel repairs are involved, the comparative operating figures as of today would be 1.9¢ per kw/hr. if purchased from the utility, as against 8.3 mills plus financing costs with the diesel. Financing the diesel over a 20-year period at a 3 mill amortization figure, gives a total cost of 11.3 mills per kw/hr.

List of Equipment

Diesel engine—Baldwin-Lima-Hamilton.
Generator and exciter—General Electric.
Switchboard—General Electric and Roller-Smith.
Injection system—Bosch.
Supercharger—Elliott.
Governor—Woodward.
Fuel meters—Niagara.
Fuel booster pumps—Brown & Sharp.
Fuel filter—Commercial Filter.
Fuel strainer—Purolator.
Lube and fuel oil—Socony Vacuum.
Lube oil pump—Roper.
Lube oil strainer—Purolator.
Lube oil heat exchanger—Ross.
Lube oil filter—Hilco.
Air filter—American Cycoil.
Exhaust silencer—Burgess-Manning.
Jacket water heat exchanger—Ross.
Pyrometers—Alnor.
Alarm panel—Viking.
Air compressor—Quincy.
Fuel oil tank gauges—Liquidometer.

COMPARISON OF FUEL COSTS—VARIOUS STEAM AND DIESEL COMBINATIONS

COMPARISON—DAILY USE

1954 Date	KW	Total KWH	KWH/ Steam	Equipment in Use Boilers	Gener. KW	Diesel	Lb. Coal Used	Coal Cost	KWH/by Diesel	Gal. Fuel	Oil Cost	*Total Fuel Cost	Time
4/8	2800	47,000	47,000	#2 & #3 boiler	3000	.....	83,800	365.40	.....	.....	.....	$365.40	Weekdays
6/16	2800	47,000	47,000	#3 boiler	3000	.....	84,000	365.40	.....	.....	.....	365.40	Weekdays
8/6	2800	47,000	40,000	#3 boiler	3000	1100 (700 KW)	65,600	285.36	7000	520	58.10	343.46	Weekdays
9/13	2800	47,000	47,000	#1 & #3 boiler	1000 & 2000	No.	92,400	411.94	.....	.....	.....	411.94	Weekdays
5/9	2800	49,000	49,000	#2 & #3 boiler	3000	.....	95,400	417.60	.....	.....	.....	417.60	Weekdays
8/24	3000	49,000	40,000	#3 boiler	3000	1100 (700 KW)	70,600	307.11	9000	730	74.70	381.81	Weekdays
9/10	3000	49,000	49,000	#1 & #3 boiler	1000 & 2000	.....	99,400	432.39	.....	.....	.....	432.39	Weekdays

COMPARISON—WEEKEND USE (SATURDAY ONLY)

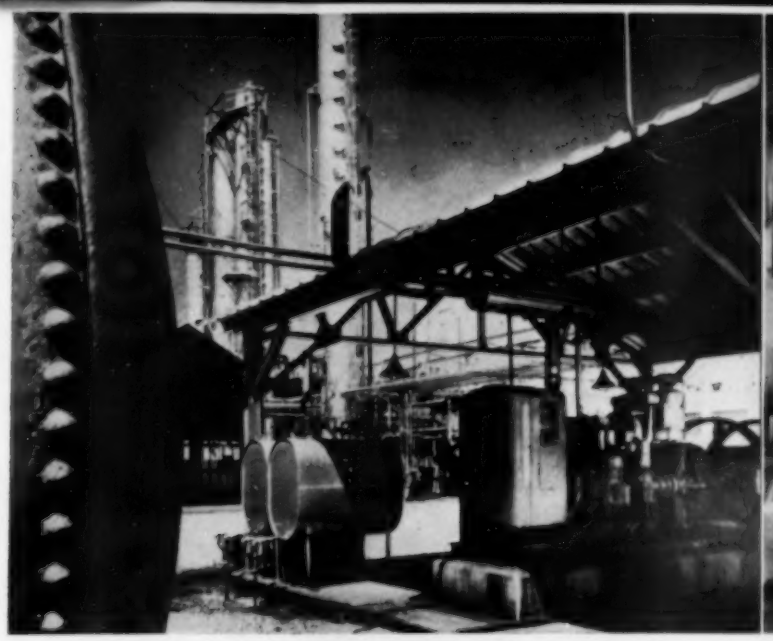
9/4/54	1900	36,000		#1 & #3 boiler	3000	.....	74,000	321.90	.....	.....	.....	321.90	Weekends
8/7/54	1900	36,000		#3 boiler	3000	.....	57,000	247.95	.....	.....	.....	247.95	Diesel Standby

SATURDAY AND SUNDAY

9/4 & 5/54	1900	65,000		#1 & #3 boiler	3000	Steam only (2 boilers)	141,400	615.09	.....	.....	.....	615.09	
8/7 & 8/54	1900	68,000		#1 & #3 boiler	3000	Steam (1 boiler)	112,000	487.20	.....	.....	.....	487.20	Diesel Standby
9/11 & 12/54	2075	72,000		#1 & #3 boiler	3000	Steam only (2 boilers)	152,800	664.68	.....	.....	.....	664.68	
9/18 & 19/54	2100	70,000		#1 & #3 boiler	3000	Steam only (2 boilers)	144,000	626.40	.....	.....	.....	626.40	
9/18 & 22/54	2200	67,000		#1 & #3 boiler	3000	Steam (1 boiler)	127,000	508.95	.....	.....	.....	508.95	Diesel Standby

* Includes 1 gal. lube oil per day @ 66c per gal. — Fuel oil @ 10.06c per gal.

Boiler Ratings: #1, 31,000 lbs.; #2, 23,000 lbs.; #3, 40,000 lbs. Steam Generators Available: 1—1000 KW; 1—2000 KW; 1—3000 KW.



Compressed hydrogen at uniform pressure is vital in platforming process. New GM-6-110 on compressor assures constant flow.

Closer view of diesel standing by to operate Ingersoll-Rand hydrogen compressor should normal power source fail.

MICHIGAN REFINERY USES DIESELS

THE performance of diesel engines installed on several operations in a Michigan crude oil refinery a few years ago has provided another outstanding story on the dependability of modern diesels. The new engines installed for Mid-West Refineries, Inc., Alma, Mich., by the Earle Equipment Co., Detroit, were General Motors two-cycle diesels. Two units were put to work in 1951 driving reciprocating pumps used in the Dubbs thermal cracking process. Early in 1952 two more units were installed. One of these operates a heavy-duty Amarillo water pump and the other an Ingersoll-Rand hydrogen compressor. Refinery officials have termed the operations performed by all four engines as "extremely critical".

The new engines demonstrate the progress made to date in diesel engine design. They operate at speeds up to 1500 rpm. on modern clean-burning diesel fuel. They start quickly, and parts and servicing points are easily reached. During the periods these engines have been in operation, they have supplied or safeguarded much of the driving force that has processed an average of 8000 barrels of crude oil per day. The engines replaced diesel models of an early vintage which were rapidly giving internal combustion engines at the plant a black eye. They operated on heavy grade diesel fuels at slow speeds. Hard-to-reach engine parts were constantly getting fouled up, requiring frequent and costly downtime for cleaning and replacement. Also, their operation was bunglesome. Starting required flywheels to be rotated until pistons reached dead center and air could be injected to start the engine cycle.

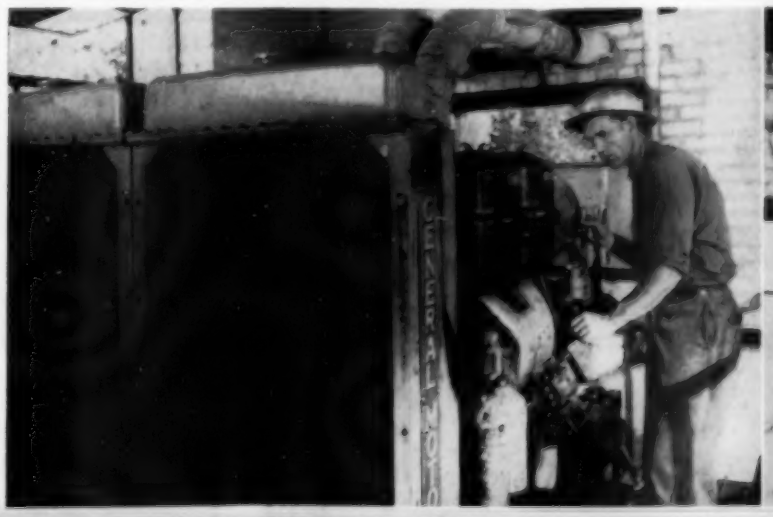
The pumps used in the thermal cracking process are powered by four-cylinder diesels and circulate oil between a fractionator tower and a furnace where oil is heated to 1000° f. They must operate day and night on runs lasting up to 80 days. According to Everett E. Thompson, vice president and superintendent of the refinery, an engine failure at any time during these runs would mean a production loss of $5000 or more to the company. This has not occurred to date, he said.

The engine on the water pump is a GM series 71 twin-six diesel which has already operated 20,000 hours without overhaul. It pulls water from a nearby river and discharges through a 16 in. main to provide the refinery's entire water supply. Thousands of gallons are needed daily to protect condensers, cracking and other equipment from the intense heat generated by refinery processes. An engine failure in this department would also be very costly and mean "real trouble", Mr. Thompson said. "We just never can stop pumping, and, since 1952, we never have been forced to stop because of engine trouble."

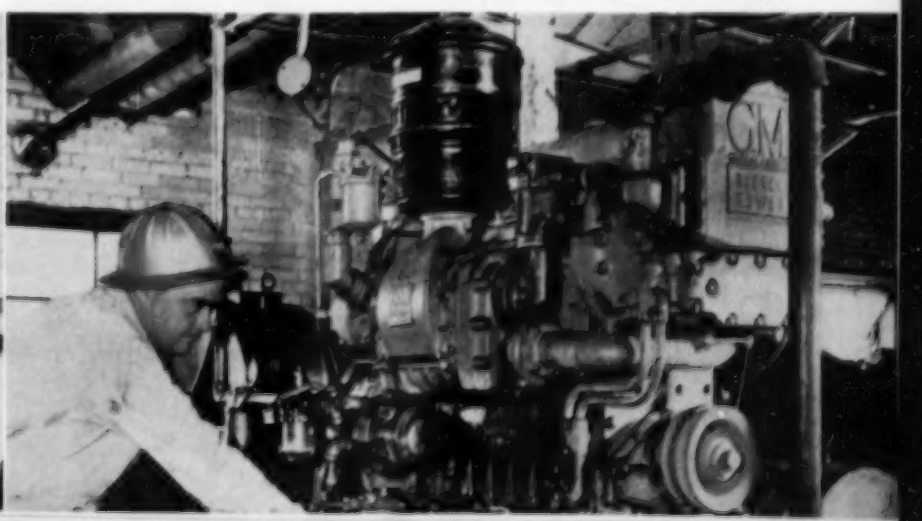
The fourth engine, a GM six-cylinder 110 model, was installed on the compressor to safeguard the refinery's platforming process. This is a comparatively new operation which upgrades straight-run gasolines, formerly a drug on the market, to a highly acceptable fuel of 93 to 96 octane rating. The process calls for a constant flow of compressed hydrogen over a platinum catalyst to prevent the formation of carbon on the catalyst. Should there be a failure or even a fluctuation in the pressure flow of the hydrogen, the entire platforming process would be down within minutes. This, according to Mr. Thompson, would also mean a loss of thousands of dollars in idled manpower and lost production. The diesel-powered compressor stands by to eliminate such a contingency.

Mr. Thompson said the GM's are given a check-up whenever processing units are down for repairs and that the practice of proper preventive maintenance has proved to be all the engine servicing required after three year's operation. The outstanding performance these units have rendered clears the record for internal combustion engines at this plant and also emphasizes the versatility and dependability of modern diesels.

Twin GM-6 diesels operate pumps 24 hrs. a day at Mid-West Refineries to provide cooling water for condensers and cracking equipment.



One of the two GM diesels installed on pumps which circulate crude oils which reach temperatures up to 1000°f. Engine runs for 80-day periods.



PUROLATOR'S NEW AIR FILTER

Convoluted Cellulose Element Provides Large Filtering Area in Small, Compact, Simply-designed Appliance; Models Offered for Diesels Up to 300 HP

Container and element of Model AF-500 filter which is 15 in. long, 12 in. in diameter and has 5725 sq. ft. of filtering surface, suitable for engines of 300 hp and over.

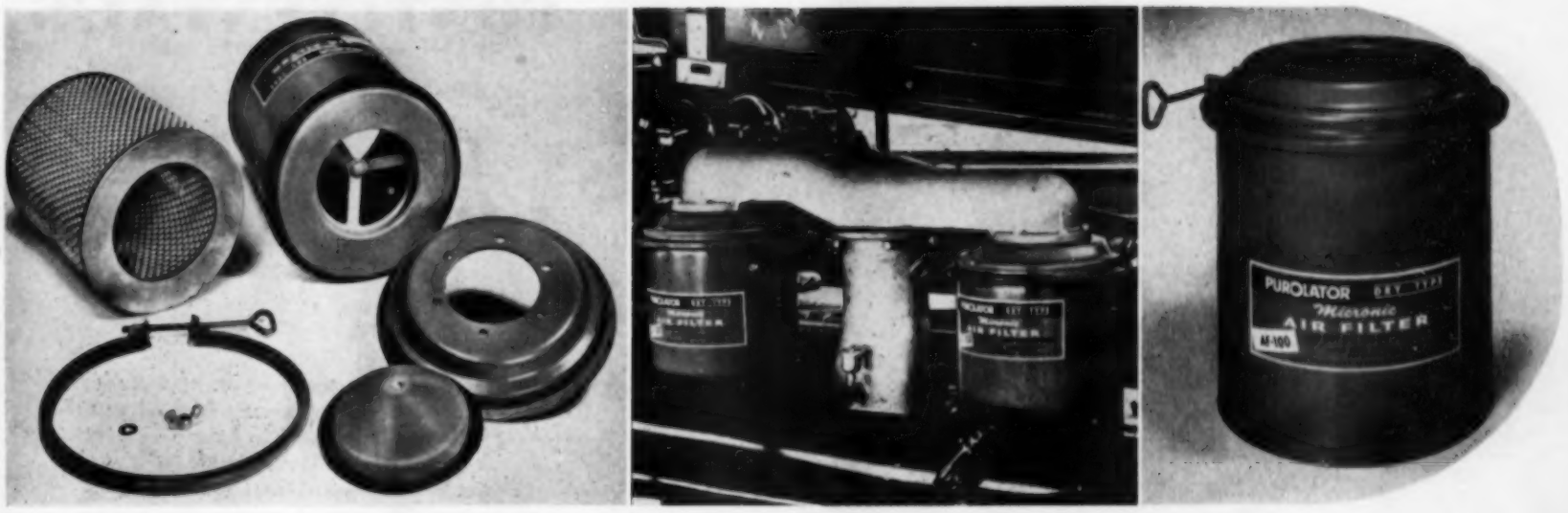
A new line of dry-type micronic air filters, designed to prolong life of diesel engines and to improve their operating economy, has been announced by Purolator Products, Inc. Company engineers developed the new filter especially to meet the rigorous requirements of truck, bus, and tractor operation; fleet service; marine power, and stationary services. Several years of field tests in these and other services demonstrated excellent performance characteristics under varying operational conditions.

The micronic element of the new filter is of resin-impregnated, convoluted cellulose. The dry-type element provides a high degree of filtration,—efficiencies over 99% with airborne particles of all sizes, regardless of engine speed. It supplies the engine with clean air, under all conditions, thus reducing wear due to abrasive particles. Because the micronic filter offers little resistance to air flow, it reduces pressure drop to a minimum, keeps engine power at maximum. Due to the high efficiency of the new air filter at all operating speeds, improved performance and decreased wear of upper piston rings reduces blow-by. This cuts lube oil consumption tests have shown.

The new dry-type filter makes possible considerable savings in maintenance costs, Purolator engineers contend. A minimum of time is required for servicing the dry-type filter which offers distinct economies in less downtime and labor. The dry-type filter is clean and easy to service, and design features simplifiy the replacement process.

Basic types in the Purolator dry-type micronic air filter line are: (1) the manifold-mounted type for up-draft, AF-100; (2) hat type for down-draft, AF-200; (3) outside cowl-mounted type, AF-400; and (4) for diesel engines in the range of 300 hp and more, AF-500. The AF-100 is intended for triple or dual mounting on diesel engines. The AF-200 is usually single-mounted on gasoline engines up to 150 hp; the AF-400 usually single-mounted on diesels up to 235 hp; and the AF-500 up to 300 hp, singly mounted on diesels.

Among the newest users of the new filter is Cummins Engine Co., Columbus, Indiana. Cummins has approved it for single- and double-mounting on its diesel engines designed for truck, tractor, and stationary service. Several other large truck manufacturers are incorporating the dry-type filter in their new lines.



Left, disassembled view of AF-100 filter showing element, cover flange, element support cup with gasket and clamping ring. Center, AF-100 dual-mounted on a 4-71 GMC diesel. Right, dimensions of 100 series filters are 8½ in. in diameter, 8¼ in. high.

Other services in which the new dry-type micronic air filter has shown good results include bulldozer tractor operation in bauxite handling aboard ship where abrasive-laden atmosphere is at its worst; heavy truck service in open pit metal mining; and state highway department vehicles, in both on and off-highway operation.

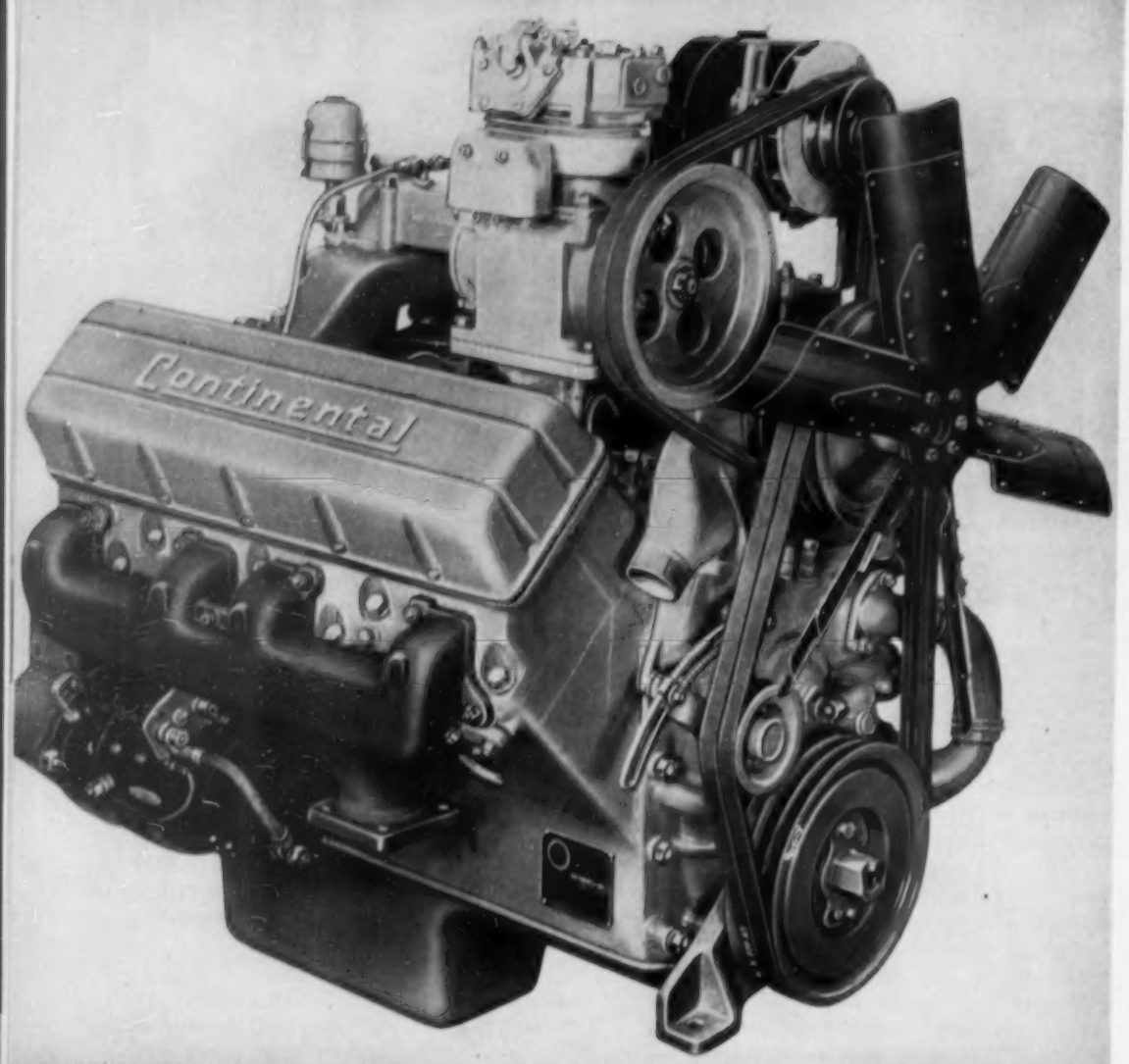
In field and laboratory tests, the new filter has shown itself capable of removing airborne particles as small as one micron, or 0.00004 in. in diameter. When the filter cake builds up in service, particles of sub-micronic sizes are removed. Thus its efficiency improves in use.

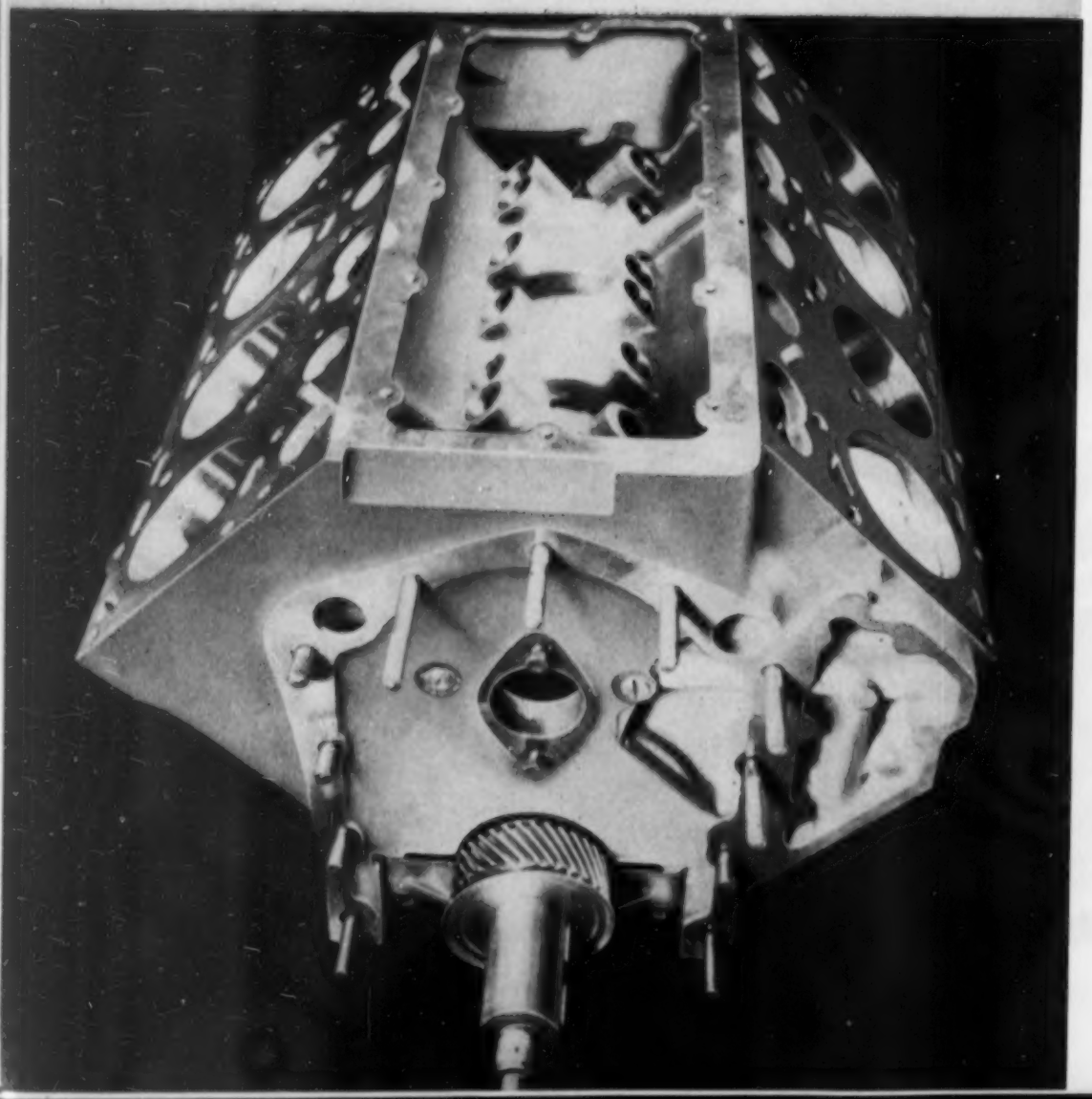
Purolator engineers say that the working principle of micronic air filtration is the closest approach yet made to the complete removal of all foreign particles from air entering an engine, without lowering its efficiency or economy under all operating conditions. It is the result of years of research during which scores of new types of filter media and filter elements were tested. The element finally developed is made of special resin-impregnated cellulose to resist moisture, acids, oils and exhaust gases. To provide the maximum filtering surface, the special cellulose element is convoluted and formed into a cylindrical refill to fit the filter housing. In the typical AF-100 micronic filter, the element has 166 convolutions and 2200 sq. in. of filtering surface.

Models AF-100, 101 and 102 have a capacity of 200 cfm with a pressure drop of 2¼ in. of water filter restriction. As an example of an actual application, two of these units, total capacity 400 cfm, are used on a Model JT-600 Cummins Diesel. The model AF-500 filter has a 500 cfm capacity with a pressure drop on different engines ranging from 5 to 8-¾ in. of water filter restriction, the amount depending on the size of the air intake opening.

Some representative sizes of the new air filters: AF-500 has 5725 sq. in. of filtering surface contained in a unit only 15 in. long and 12 in. in diameter. The 100 series offers 2220 sq. in. of filtering area in a filter 10 in. long and 8½ in. in diameter. The 200 series has 1400 sq in. of surface, is 6-7/16 in. long; 9½ in. in diameter.

Filter mounted on a bulldozer tractor used in a ship's hold shows accumulation of bauxite dust. Tests indicate new dry-type filter removes 99% of particles from air.





CONTINENTAL'S NEW 182 HP, V-8 DIESEL ENGINE

HIGH power-to-weight ratio and unusual compactness feature the new V-8 model WD-8603 Cushioned Power diesel engine announced by Continental Motors. It delivers 182 hp at 2800 rpm and is available in versions engineered specifically to a wide range of transportation, marine and industrial applications. Latest in a line of internal combustion power plants extending without break back to 1902, this new Continental diesel is shorter and narrower than conventional V-8s of comparable output.

The engine has replaceable main bearings consisting of a steel back to which pure copper and nickel powder are sintered, forming a matrix into which an overlay of corrosion-resistant high lead base babbitt is cast. Bearings are securely locked in both the case and the cap. Connecting rod bearings are replaceable, and are of the same type.

Piston pins, and steel-backed bronze bushings in the upper end of the connecting rods, are held within extremely close limits. The crankcase, which is split below its center for added strength, is cast integral with the block. It is of high quality chrome molybdenum alloy iron, heavily ribbed for strength.

The cooling system includes a leakproof water pump, with impeller mounted on two widely-separated ball bearings. Full-length water jackets, a Continental feature of long standing, practically eliminates cylinder distortion. The whole system can be automatically controlled by means of a thermostat. Crankshafts are drop forgings with various sections proportioned for rigidity. They are heat-treated to perfect structure and relieve strains. Journals are Tocco-hardened. Crankshafts are counterweighted, and statically and dynamically balanced. Cylinder heads are of chrome molybdenum alloy iron, and are held in place by 36 alloy steel cap screws.

Lubrication is full pressure to all main, connecting rod and camshaft bearings, as well as to timing gears and overhead rocker arms, the over-flow from

Top—**Transportation version of latest line of Continental internal combustion engines which corporation has been building without interruption since 1902.**

Bottom—**The one-piece crankcase is made from high quality chrome molybdenum alloy iron, heavily ribbed and patterned for strength and split below center for added ruggedness.**

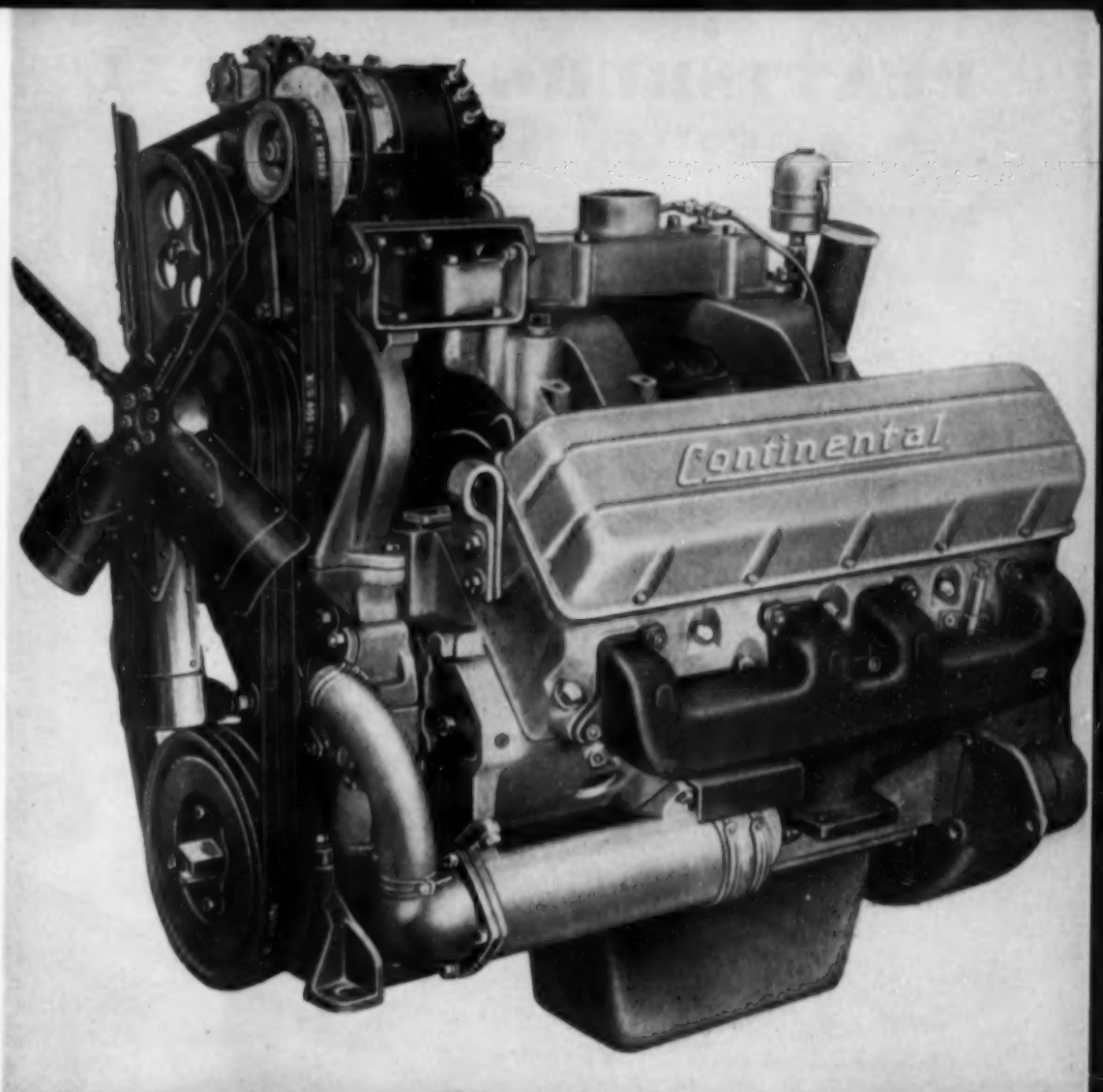
Various Versions of Engine Are Designed for Wide Range of Transportation, Marine and Industrial Applications

By BRUCE WADMAN

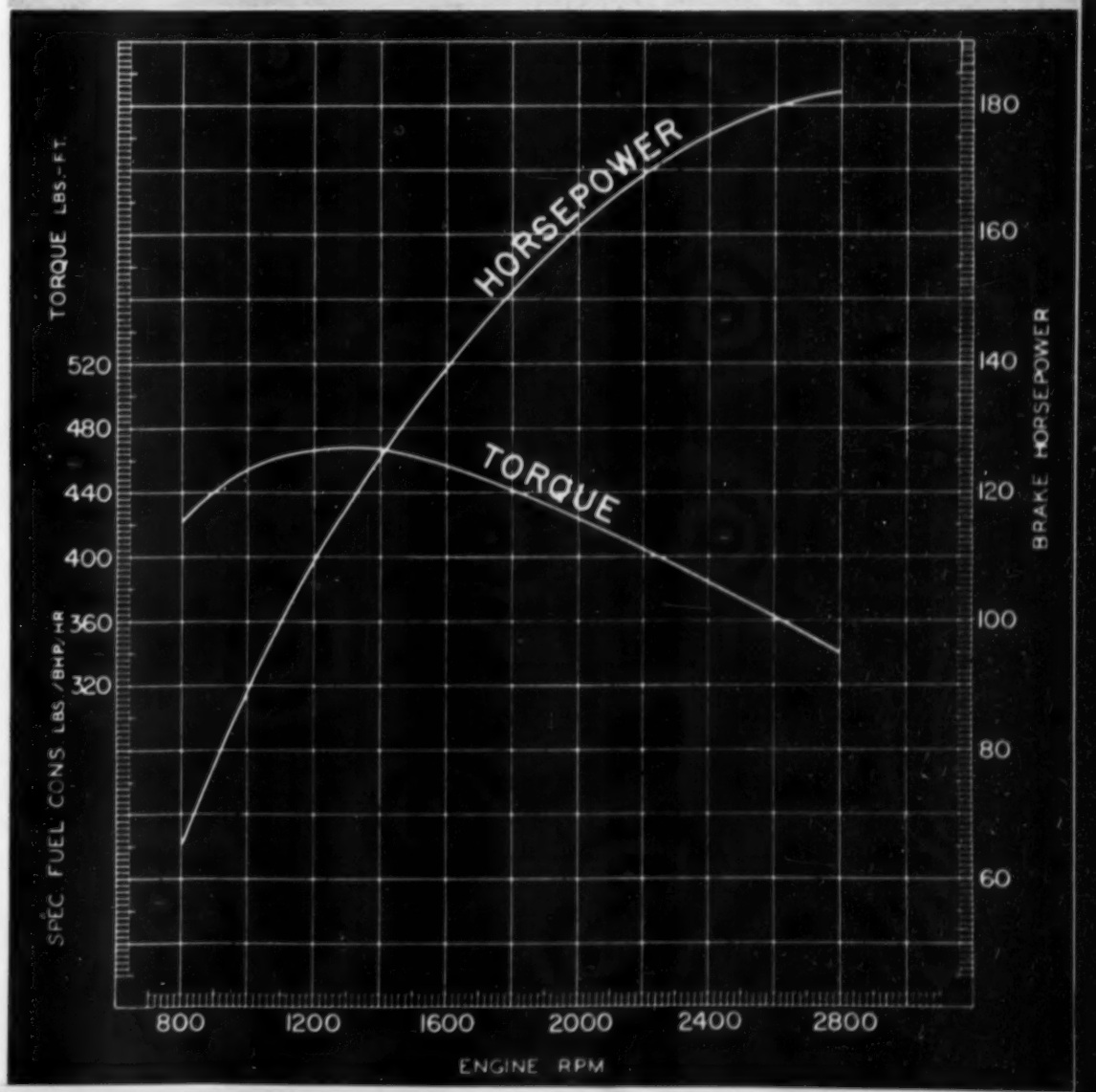
which lubricates the tappets. A submerged gear-type pump, driven off the camshaft and protected by a large Float-O screen, draws upon the cleanest oil at all times. The pump is protected by a tamper-proof, built-in pressure relief valve. Cylinder walls are supplied with sufficient oil, even at low speeds, from indexed spurt holes on the up-coming thrust side of the large end of the connecting rods. Oil level indicators and connections for oil pressure gauges are provided. An integral oil cooler with built-in by-pass adapts this engine to continuous heavy-duty service.

The combustion chamber is of the Lanova type, with an energy cell being utilized, similar to other Continental diesels. The fuel injection system consists of the distributor-type pump serving injectors which are located on the inside of the "vee." The fuel pump is located in the center of the "vee" at the rear of the engine. The Roosa-Master or the American Bosch PSB fuel pumps are optional. Pistons of lightweight aluminum alloy, tin-plated to prevent scuffing, are domed to promote high turbulence. They are matched and held within close limits to insure smoothness at all speeds. Top rings are chrome plated for long life.

Engineering details: Cylinders, 8; bore and stroke, 4-3/4x4-1/4 in., displacement, 603 cu. in., bare engine hp, 182 governed at 2800 rpm; torque, lbs/ft, 468@ 1200; compression ratio, 15.8:1. Number of crankshaft main bearings, 5; main bearing diameter, 3½; length, front, 1-5/8; intermediate, 1-3/4; center, 1-13/16; rear, 2-3/4. Number of camshaft bushings, 5; camshaft bushing diameter and length, front, 2½x1-3/8; second, 2½x2-1/32; third, 2½x1-1/16; fourth, 2½x1-1/16; rear, 2x1. Connecting rod length, center-to-center, 8-3/8; bearing diameter, 3-1/8; bearing length, 1-9/16. Piston length, 5-7/16. Valves, intake, diameter, head, 2-5/64; throat, 1-15/16; lift, .5667; seat angle, 45 degrees. Valves, exhaust, diameter, head, 1-49/64; throat insert, 1-3/8; lift, .5667; seat angle 45 degrees. Weight, standard engine including flywheel housing and manifolds, approximately 1696 lbs.



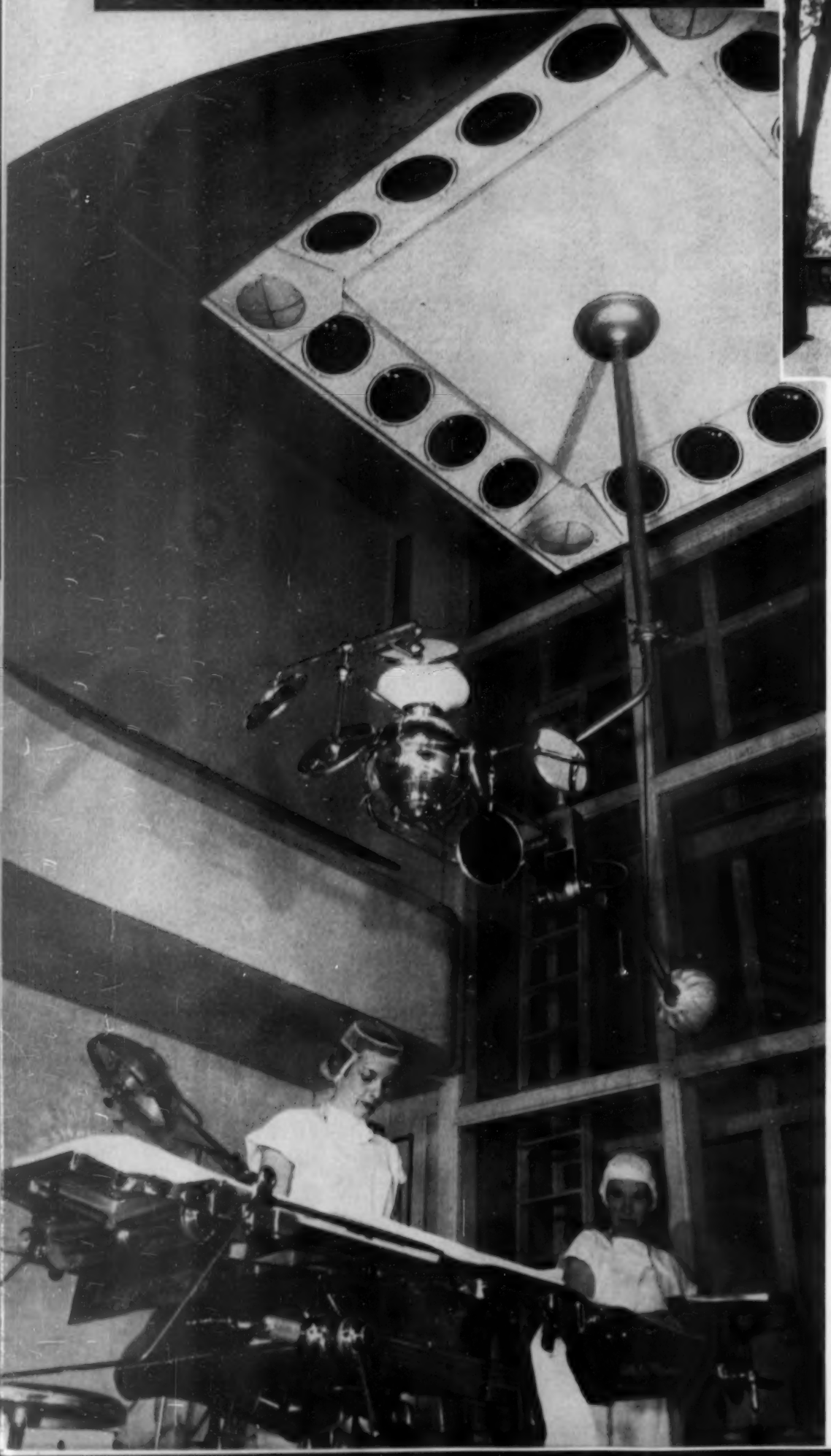
***Top*—Fuel pump and injectors are located within the "vee" with pump mounted at rear of engine. Roosa-Master and American Bosch are optional in Continental's new V-8 Red Seal diesel.**



***Bottom*—With 603 cu. in. displacement, bore of 4¼ in. and stroke of 4½ in., Continental's latest diesel torque delivery is 468 @ 1200, giving the engine a high power-to-weight ratio.**

PLATTSBURG HOSPITAL ASSURED POWER

A CIVIL DEFENSE INSTALLATION



Fairbanks-Morse standby diesel will keep 48 lights (1000-watts each) burning in four operating rooms such as this if power failure stops normal flow of electricity.

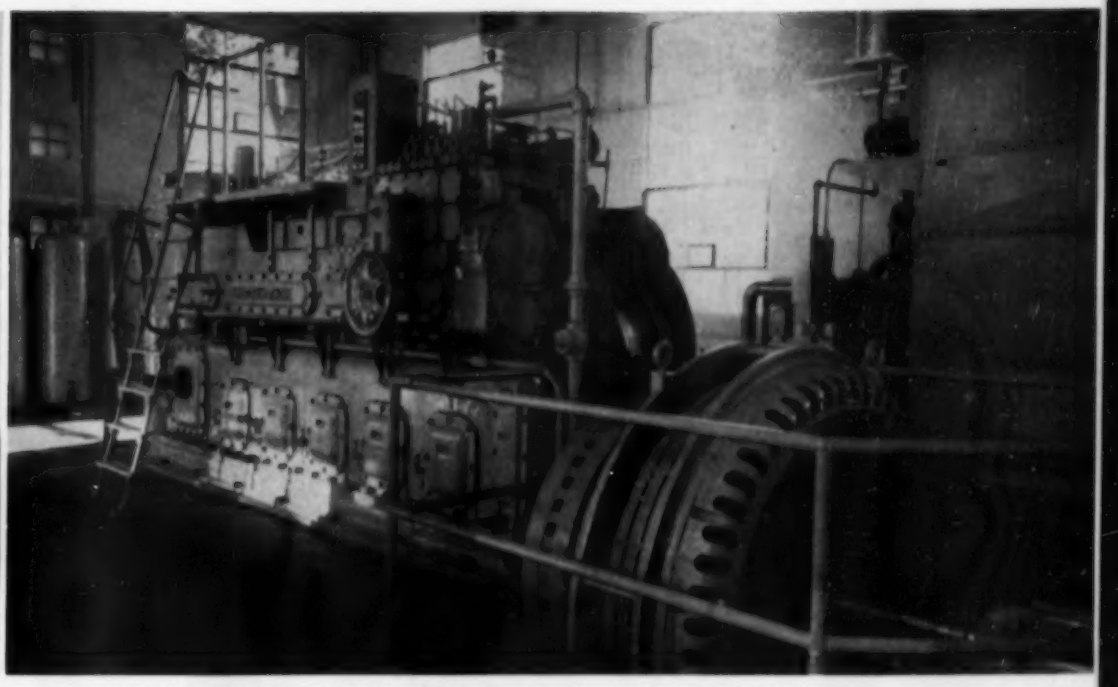
Interruption in Service Proves Wisdom of Installing 500 Hp Emergency Diesel-Generator Set in Upstate New York Community Hospital

BY severing power lines, a hurricane, enemy air attack or other major disaster could knock out a community's hospital at the very time the community needs it most. Operating room lights would be blacked out, X-ray machines, fluorscopes, electric sterilizers, physio-therapy apparatus, iron lungs, and other key equipment would be rendered useless. Elevators, essential to patient transfer and staff deployment, would be at a standstill. In short, when the number of casualties was at its highest, urgently needed treatment facilities would be at their lowest, the hospital crippled.

To guard against such a catastrophe, Physicians Hospital, a 350-bed general hospital at Plattsburg, N. Y., has completed construction of a small power station at the rear of its main building, installing a new 500 hp Fairbanks-Morse diesel engine as an emergency standby unit. The new engine is large enough to meet all power demands at the hospital, permitting it to continue at peak efficiency even in the event of a complete shutdown at the local municipal power plant, from which the hospital purchases power.

The hospital's new standby plant also protects it against the inadequacies or failure of hydro power, which is the chief source of energy in this section of northeastern New York. When water supply is

Emergency already has proved wisdom of installing diesel-generator set in this upstate New York Community Hospital. Standby unit absorbed full load in 4½ minutes.



Rated 500 hp. at 400 rpm., the F-M generator set is equipped with Woodward governor, Hilco cartridge-type lube oil filter, and Roper before-and-after lube pump. There is a Madison-Kipp force feed lubricator, Purolator strainer, and Alnor pyrometer.

low during the summer, early fall and late winter months, the local Plattsburg Municipal Lighting Department, which purchases power from a four-station hydro-electric plant on the Saranac River and distributes it throughout the city of Plattsburg, must supplement the decrease in hydro production with power from its own 3236 kw standby diesel plant. With a peak demand which exceeded 9700 kw in 1953, however, this municipal plant cannot supply all of its customers in the event of a complete hydro failure. Approximately two-thirds of the city would be faced with a blackout.

In such an emergency, of course, the hospital would receive priority, but by constructing its own standby plant, it has added protection against failure in the distribution system. Unlike most consumers, a modern hospital cannot tolerate the slightest interruption in service. A patient on an operating table, for example, cannot wait for a line breakage to be repaired; he often cannot wait while someone rigs emergency lighting. There must be a guarantee of continuous power. With its new standby diesel plant, Physicians Hospital has acquired such a guarantee.

On June 8, 1954, while Glen Robbins, assistant engineer at the hospital, was busy in the main building, a failure in the city's distribution system shut off all lights throughout the hospital grounds.

All electrical equipment came to a standstill and all clocks and elevators stopped. As Mr. Robbins raced to the powerhouse a 15 kw Fairbanks-Morse diesel-generator set, in operation at the hospital since 1949, automatically cut in and supplied power for one light in each of the four operating rooms and for the oil burners and water feed pumps in the hospital's boiler room. Within two minutes, Mr. Robbins had reached the powerhouse and within a total of 4½ minutes after the lights first went off, he had the 500 hp Fairbanks-Morse diesel engine on the line at full load.

The power first went off at 2:18 p.m. and the Fairbanks-Morse standby engine went on the line at approximately 2:22 p.m., restoring normal service throughout the hospital grounds. At 2:38 p.m. the failure in the distribution system was corrected and the standby engine was taken off the line.

Thus, what might have been a serious 20-minute break in normal hospital operations was alleviated immediately and eliminated in 4½ minutes. Had Mr. Robbins been at the powerhouse, the delay in provision of full power would have been reduced to 2½ minutes or less.

Its new powerhouse provides Physicians Hospital with the first full standby protection it has enjoyed since 1934. At the time the hospital was originally built in 1926, with funds provided by the W. H. Miner Foundation, of Chicago, Ill., two 75 kw uniflow steam engines were installed. They remained in service for approximately eight years, finally outliving their usefulness and being removed. In 1949, the hospital installed a 15 kw, Fairbanks-Morse diesel-generator set, rated 18.75 kva, 3-phase, 60-cycles, and driven by a 3-cylinder, 1200 rpm F-M diesel engine. This unit was originally installed as a standby engine in the main building and is now in service at the new powerhouse. It is equipped with an automatic line failure control which puts it on the line immediately in the event of a power failure and supplies power for the oil burners and water-feed pumps in the hospital's boiler room and for a single light in each of the hospital's four operating rooms.

With a planned capacity of 350 beds, Physicians Hospital has 210 beds ready for use. It is a voluntary, community-type hospital, operated on a non-profit basis and supported by funds from patients and from the Foundation. It is one of the largest and best-equipped hospitals in northern New York State, serving a wide area in the vicinity of Plattsburg and Lake Champlain. In addition to the main building and auxiliary buildings, there is a beautiful, 42-room nurse's residence on the grounds, constructed in 1953 and designed to provide home-like accomodations for 80 resident nurses.

In 1953, Physicians Hospital purchased a total of 856,100 kw/hrs from the Plattsburg municipal plant, with the total for the first seven months of 1954 reaching 521,600 kw/hrs. Its peak demand, reached in January and July, was 195 kva.

The Model 33 Fairbanks-Morse diesel is rated at 500 hp at 400 rpm. It has five cylinders of 12 in. bore and 15 in. stroke; is one of the 2-cycle, solid-injection type, and drives a 429 kva, 343 kw, 240-v., 3-phase, 60-cycle F-M alternator. V-belted to the alternator shaft is a 7½ kw, 60-amp, 125-v, 1750 rpm shunt-wound exciter. A power unit larger than necessary for current peak loads was installed to provide extra power for the emergency fire pumps and to allow for future expansion of facilities.

Although it is impossible to arrive at an accurate fuel consumption average (there is no totalizing kw-hr meter installed at the plant) it is possible to compute an accurate lube consumption average.

In 108½ hours of operation, the engine consumed a total of 13 gals. of lube oil, for an average of 4175 hp/hrs per gal. No. 2 fuel oil is delivered at the plant by truck and is unloaded into two 10,000-gal. underground storage tanks, each equipped with a levelometer. From the storage tanks, the fuel is picked up by two 1¼ in., 1½-hp transfer pumps and is sent through a meter to a 600-gal. day tank located under the main engine and equipped with an automatic float control which governs the two motor-driven transfer pumps. It is picked up from the day tank and sent through a duplex fuel oil filter to the individual injection pump and nozzle at each cylinder by a built-in pump.

Rear view of the standby power plant at Physicians Hospital, Plattburg, N. Y. Note the Air-Maze scavenging air filter and the Burgess-Manning exhaust snubber. A pipe carries exhaust gases from snubber to boiler stack, preventing it from reaching rooms.

A high-detergent type lube oil, stored in 55-gal. sealed drums, is used in the new engine. It is circulated through a pressure system by a built-in, gear-type pump, passing first through an evaporative cooler and full-flow strainer before reaching the pistons for cooling, the bearings, pins and other wearing surfaces. The power cylinder force-feed lubricators are kept filled with lube from the pressure system automatically, while the lube collecting in the lower base is circulated continuously through a cartridge-type, cellulose-packed filter by a motor-driven pump. A 2 in. before-and-after pump, driven by a 5 hp motor, is used in starting and shutting down operations. To add lube to the new engine, Mr. Robbins connects a hose from a 10-gal. container to the suction side of the filter pump, permitting the lube to flow from the container, through the cellulose cartridge, and into the lower engine base.

City water, treated in a water softener, is used to cool the big engine. It is circulated under pressure through the evaporative cooler by a motor-driven centrifugal pump, passing through the cooler and into the closed jacket-water system on the engine.

Spray water for the cooler is drawn from a hot well by another motor-driven centrifugal pump. Automatic, thermostically-operated controls position shutters and by-pass lube and jacket water around their respective coils in the cooler, thus keeping lube and water at desired temperatures.

Scavenging air for the 2-cycle engine is drawn through an oil-bath type filter at the rear of the plant and is sent to the cylinders by a built-in, double-acting blower, driven directly off the crankshaft. Starting air is supplied at a pressure of 250 lbs. by a two-stage compressor driven under normal conditions by a v-belted, 3 hp, 1745 rpm motor, and in emergencies by a v-belted, 3 hp gasoline engine.

Exhaust gases are expelled through a vertical snubber at the rear of the plant, passing from the snubber through a line to a towering boiler stack about 150 feet away at the rear of the main building. In this way, the gases are prevented from being carried by the wind into the patients' rooms.

The final piece of major equipment installed in the new powerhouse is a combination gauge board and switchboard. The two-panel switchboard is equipped with both hand and electrically-operated switchgear, an ac ammeter, an ac kilowatt meter, an ac volt meter, a cycle meter, a dc ammeter, two time overcurrent relays, two phase sequence and undervoltage relays and a voltage regulator. The gauge board is equipped with a multi-point exhaust pyrometer; visual and audible alarms on jacket-water and lube oil pressures and temperatures; start-stop buttons on the before-and-after pump, on the jacket-water pump, the evaporative cooling fan motor and the lube oil filter pump; a cut-off power switch for the diesel plant; pressure gauges on lube oil, jacket water and scavenging air; and temperature gauges on lube oil and jacket water.

The powerhouse itself is an attractive, all-brick building, measuring approximately 65x30 ft. It has four large windows front and rear, running from floor to ceiling, which make interior lighting unnecessary during the daylight hours. There is no basement. All auxiliary equipment in the powerhouse is efficiently arranged along the east, south and west walls, with distinctive colors identifying all fuel, air, lube and water lines.

The addition of the 500 hp Fairbanks-Morse standby engine has given Physicians Hospital a security it has not known for 20 years. With an operator available 24 hours a day, and with a simple handwheel starting mechanism which permits the big engine to be put on the line at full load within two minutes, the hospital no longer fears the crippling effects of a power failure. The community itself benefits from this protection, enjoying a guarantee of continuous, peak-efficiency hospital service during any and all emergencies. Thomas Long is chief engineer, assisted by Mr. Robbins. Chiefly responsible for the construction of the new standby plant is the hospital's Board of Directors, the W. H. Miner Foundation and S. W. Rice, hospital superintendent.

List of Equipment

Main engine, generator, alternator and exciter—Fairbanks-Morse Model 33, 5-cylinder, 12 in. bore and 15 in. stroke, 2-cycle, solid-injection diesel engine, rated 500 hp at 400 rpm.

Governor—Woodward.

Levelometers—Liquidometer.

Fuel oil—Copland.

Fuel oil duplex filter—Nugent.

Fuel oil meter—Niagara.

Lube oil—DTE, Socony-Vacuum.

Lube filter—Hilliard.

Before-and-after lube pump—Roper.

Full-flow lube strainer—Purolator.

Force-feed lubricators—Madison-Kipp.

Thermostatic control valves—Minneapolis-Honeywell.

Air compressor—Fairbanks-Morse.

Air intake filter—Air-Maze.

Exhaust snubber—Burgess-Manning.

Switchboard and gauge panel—Marquette Electric.

Meters and relays—General Electric.

Exhaust pyrometer—Alnor.

Water softener—Fairbanks-Morse.

AUTOMOTIVE DIESEL PROGRESS

A COMMENTARY BY **MERRILL C. HORINE**

Merrill C. Horine, for 38 years a member of the Society of Automotive Engineers, has been actively engaged in automotive engineering, sales promotion and training, advertising and editing of automotive publications since 1907. He has contributed numerous papers on diesel and allied subjects to the SAE and other organizations. An officer in the Air Service in World War I, he was a consultant to the Chief of Ordnance and the Automotive Division of the War Production Board in World War II.

POWER IN A SMALL PACKAGE FOR AUTOMOTIVE APPLICATION

POWER in a small package seems to be the call for automotive application of diesels in the transport field and several engine manufacturers are bending every effort to supply the need. In the past, for horsepower equivalent to that obtainable from gasoline engines in the larger sizes of highway vehicles, diesels of considerably greater bulk and weight were required. This naturally increased the cost of installation, since extensive chassis alterations are required to accommodate the greater length and weight involved.

Obviously, the solution is the V-eight, offering as it does shorter length, lower height and greater general compactness for the same displacement. These, together with the shorter shafts also permits marked saving in weight.

In these new engines, too, the trend is toward shorter stroke in relation to bore size, thus so reducing piston speed that higher rpm becomes practicable. As a consequence of this, horsepower per cubic inch of displacement rises, while pounds per horsepower decreases.

Of course, the V-eight is by no means new, either in diesel or automotive practice. This year, nearly every automobile manufacturer in the country is offering V-eights, some to the exclusion of all other types. Cummins, Caterpillar, Waukesha and many other automotive diesel builders have produced V-eights for construction, industrial and agricultural applications for many years. Some have had extensive use in the big off-highway trucks and tractors. General Motors diesels in the larger sizes have been produced as V-eights from the very beginning; but not as yet for application to trucks and buses.

In addition to designs now in development in the shops of several prominent automotive diesel builders, brand new models of moderate displacement have recently been put into production by Continental and Hercules, respectively.

The Continental, of 603 cu. in. piston displacement, with a bore of 4¾ in., has a stroke of only 4¼ in. and is rated at 182 hp at 2800 rpm. It is just under 33 in. wide and 44⅞ in. long overall, its weight being given as 1696 lbs., or only 84 lbs. more than its gasoline counterpart.

The Hercules has 4x4 cylinders, giving 402 cu. in. piston displacement and is rated at 160 hp at 3000 rpm. Its dimensions from fan to back face of flywheel is 38⅛ in. and its overall width, 32⅛ in. The weight, complete, is given by the manufacturer as 1300 pounds.

An interesting controversy is arising as to the merits of automatically-variable injection timing in diesel engines. Its proponents have long held that a diesel, no less than a gasoline engine, benefits from variable timing, pointing out that the timing for maximum speed and power must of necessity be unduly early for slow speed, resulting in rough idling and knocking at low speed. Obviously if injection were timed for smoothest idling and slow-speed running, it would be far too late for full development of power and economy at higher speeds.

It is usual with fixed timing to select a point at neither extreme, but somewhat favoring the higher speed range. Opponents of automatically-variable injection timing aver that at speeds up to 2400 rpm there is little gain either in power or economy when this feature is added, though admitting that for higher speeds, appreciable improvement may be expected.

Actually, these two points of view are not too contradictory. It is certainly true that for stationary and marine service, where speeds are fairly constant, fixed timing has proven satisfactory. Variable timing certainly can offer no gain in power and economy at the speed of maximum output. But where the application is such that the engine must operate at a variety of speeds and loads, must idle frequently, and must be started from cold at frequent intervals, then not only the power and economy at other than maximum speed must be considered; but other desiderata must be taken into account.

Premature injection at the lower speeds produces combustion shock, which is not only wasteful of fuel and inimical to development of power; but is harmful in other ways. Rough running is prejudicial to public relations, particularly in buses, engenders negative driver reactions and, more important still, shortens the life and increases the maintenance cost of the engine and drive line.

An additional benefit to be derived from retarded injection timing at slow speed is the greater facility of starting which it affords. Since it is the heat of compression which ignites the fuel, it is elementary that the hotter the air at the moment of injection, the more readily ignition will take place and the engine start.

Air temperature is the result of compression pressure and the latter rises most rapidly at the end of the compression stroke. A very few degrees of flywheel travel at this upper end will make a big difference in the temperature of the air. Early injection consequently means injection into air at a sensibly lower temperature than where it is injection delayed.

That the advantages of automatically-variable injection timing are being given more recognition in the automotive field is evidenced by the increasing number of injection systems in which this feature is being incorporated.

TWO NEW DIESELIZED UNITS

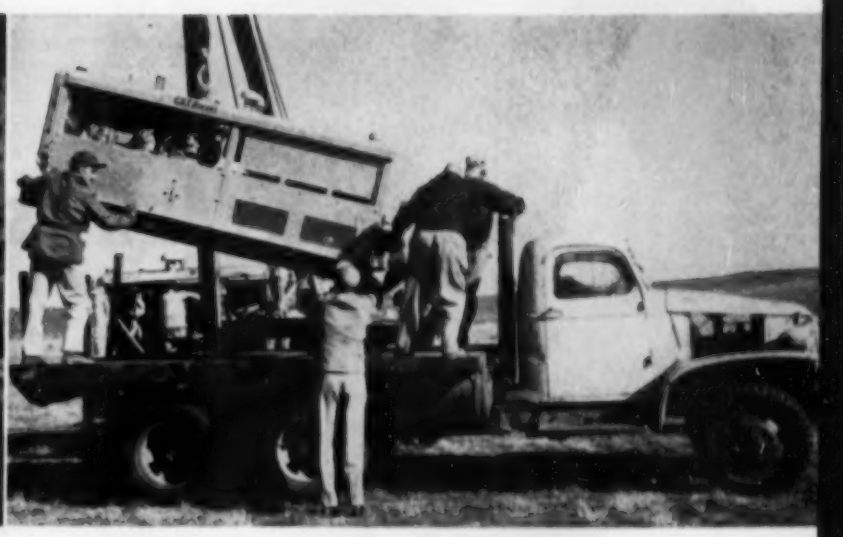
Two views show new Cat 583 pipelayer in action on Panhandle Eastern in Kansas on R. H. Fulton's job.

MEMBERS of the Pipe Line Contractors Association who attended the annual convention in Los Angeles were the first to see two new Caterpillar Tractor Co. units developed especially for their type of work. Most spectacular was the new Cat 583 pipelayer with a lifting capacity of 130,000 lbs. and a high ground clearance of 21 in. A twin arc-welder, suitable for mobile field service, was the second machine unveiled.

Caterpillar engineers say the 583 pipelayer was developed "from the ground up" for the specialized function of laying pipe. It is powered by a new Cat diesel which delivers 190 hp at 1200 rpm. Power is transmitted through a combination three-stage Twin Disc 5:1 torque converter and a special three-speed transmission. Excellent stability is claimed through use of 86 in. gauge, 28 in. track shoes, a seven-roller track frame, and an overall length of 211½ in. Engine and boom are centered and counterweights are split fore and aft on the winch mechanism.

The pipelayer drive is completely independent of the tractor master clutch and the torque converter. A newly designed power take-off permits power to

Two Cat D315 twin arc-welders fit on ordinary truck flatbed. One truck can provide four 300 amp welders at one location, often needed for "stringer bead" or "hot pass" welding on a pipeline job.

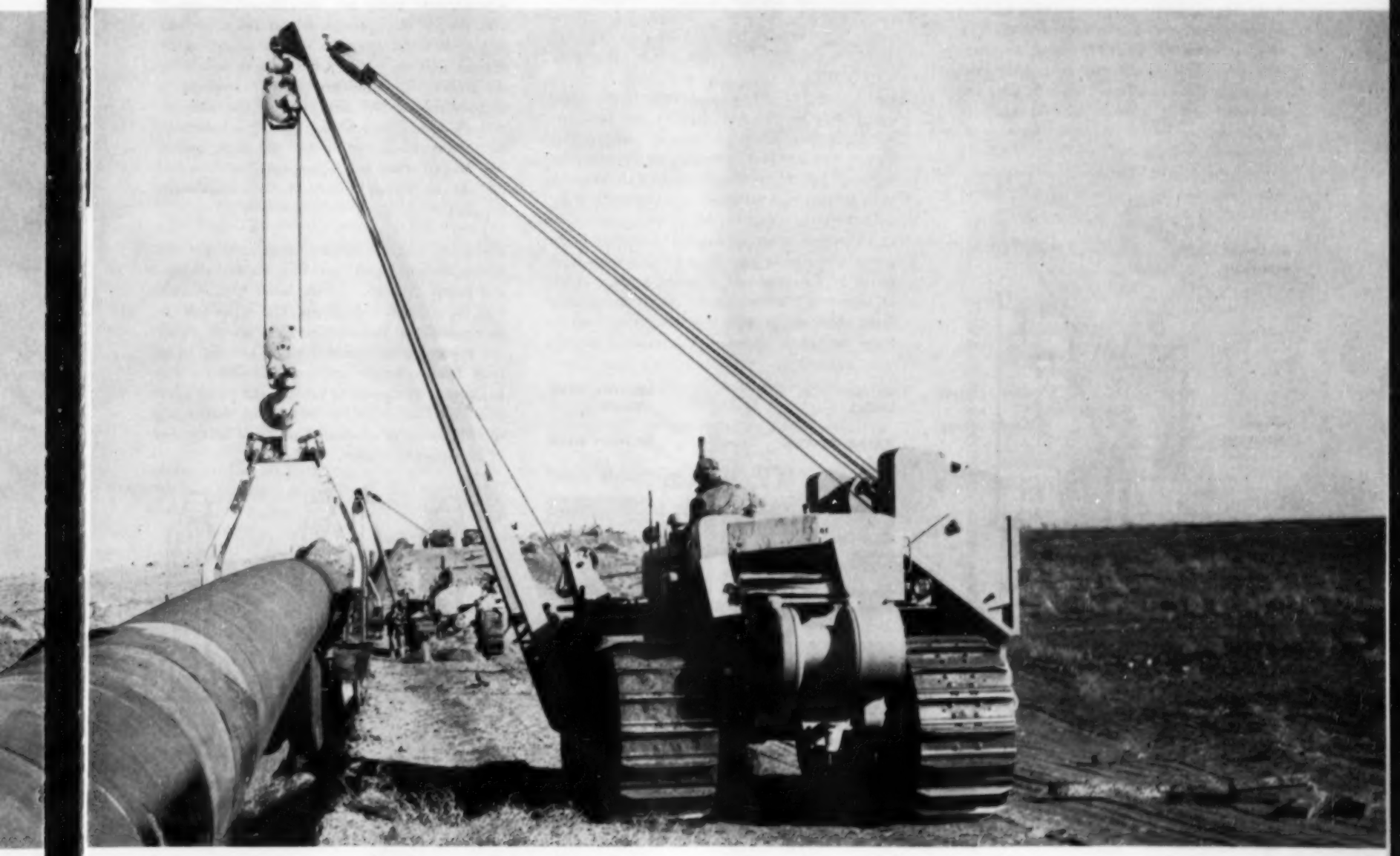


Developed in conjunction with Lincoln Electric Co., this new Cat unit offers two 300 amp generators driven off a common shaft. Mounted on a skid frame, gross weight is about 5200 lbs.

be transmitted from the diesel directly to the pipelayer master clutch. The hydraulically-actuated counterweights pivot at the bottom, granting the operator good side and bottom clearance when in close proximity to obstructions.

The new engine is a 4-cycle, valve-in-head, 6-cylinder diesel. It has capsule-type injection valves and a gasoline starting engine with an electric starter. The diesel's displacement is 1246 cu. in., bore and stroke, 5¼x8. The shipping weight of the complete 583 pipelayer is approximately 78,132 lbs.

The mobile arc-welder was developed by Caterpillar in conjunction with Lincoln Electric Co. The unit consists of a Cat D315 diesel and two Lincoln 300 amp welding generators in a single frame. Both generators are driven by a common shaft. However, separate control panels and leads allow each generator to be operated independently. The complete unit is mounted on a skid frame 10 ft. long and 3½ ft. wide. Its gross weight is approximately 5200 lbs. Field tests were made on a pipelaying job near Greensburg, Kan.



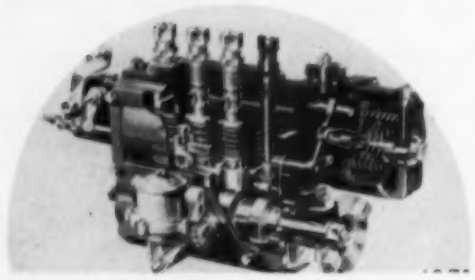
WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **HAMISH FERGUSON**

Hamish Ferguson received his training and early experience with the English Electric Company. Subsequently, he spent a number of years with a firm of diesel engine consultants, London, and in 1944 became secretary to the Diesel Engine Users Association. In 1953, he relinquished his appointment to devote his time to private consulting work connected with diesels and gas turbines.

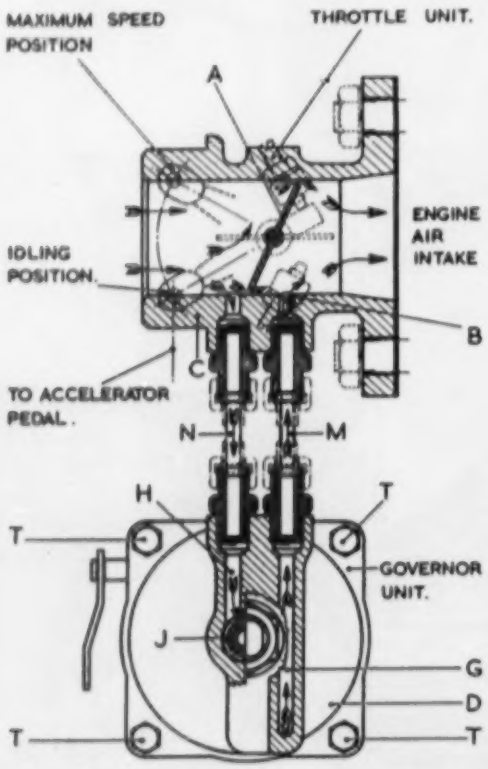
Simms Fuel Injection Equipment

SIMMS Motor Units Ltd., Oak Lane, East Finchley, London, is one of the three major companies in England specializing in the production of fuel injection equipment. The name of Simms stands high among the pioneers of the motor industry for the late F. R. Simms, founder of the Company, was the originator and co-patentee of the Simms-Bosch magneto in 1895 and he subsequently designed the first four-cylinder engine with mechanically operated overhead valves in 1902. Until 1934 Simms specialized in the production of electrical equipment required for commercial vehicles, such as magnetos, dynamos, starters, lamps, couplings, etc. With the development of the high-speed diesel for use in motor transport they entered the field of fuel injection equipment and they claim that their pump is the only one to be of entirely British design.

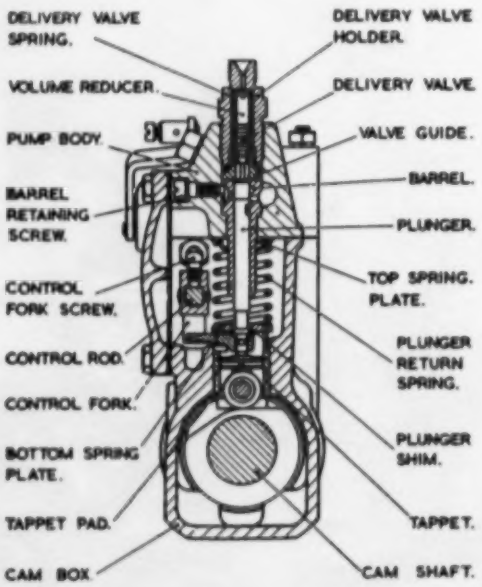


Fuel Pump. The SPE-A series multi-cylinder injection pumps are the type fitted to the Ford and B.M.C. engines. They are normally supplied with a pneumatic governor operated from the induction manifold but a centrifugal governor is available as an alternative if preferred. The element is of the normal type in which the fuel delivery is controlled by an inclined groove or helix. The rotation of the pump plungers to vary the fuel delivered, is effected by a control rod of square section, sliding in bushes in the cam case on which are clamped forks which engage with arms projecting from the lower ends of the plungers. Movement of the control rod therefore causes an angular movement of the arm and plunger. Calibration of the fuel delivery of each element is effected by slackening the clamping screw in the control fork and sliding the latter along the control rod. This method of fuel control has the advantage compared with rack and pinion mechanism in that back lash is considerably reduced, there being only one clearance compared with two on the conventional control sleeve and pinion, and this clearance is at a greater radial distance from the plunger axis, thereby improving the accuracy of calibration. Friction resulting in sluggish control rod movement is also reduced. When a pneumatic governor is fitted, a maximum fuel stop is provided at the free end of the control rod. An excess fuel device for providing extra fuel for cold starting can be fitted in this position when required.

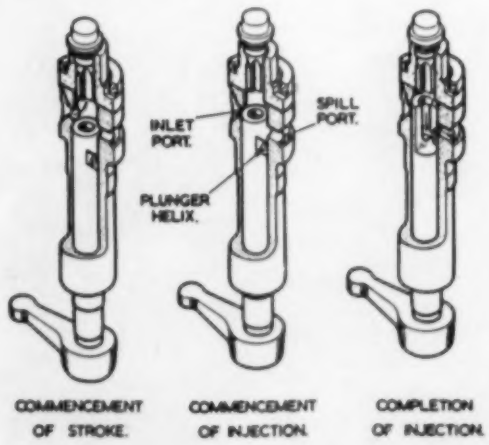
The pump casing is divided horizontally into two halves, the upper part containing the fuel passages and pump elements, and the lower half, or cambox, the camshaft and tappets. The upper half can be removed for inspection of elements, etc., without disturbing the camshaft. The camshaft is of large diameter to give the maximum stiffness. The adjustment of tappets to equalize the phase angle between injection is carried out by exchanging spacing pieces of graduated thickness in the top of the tappet by circlips.



DIAGRAMMATIC VIEW OF GOVERNOR & THROTTLE



CROSS SECTION OF PUMP TYPE SPE 4A



PUMP ELEMENT

Fuel Injector. The injector consists of a nozzle assembly and a nozzle holder assembly clamped together axially by the nozzle nut. The steel nozzle holder body incorporates lugs for clamping the injector into the cylinder head and contains the pressure spring, adjusting nut and spindle, while the nozzle assembly comprises the nozzle body and needle valve. Fuel pressure from the injection pump acts on the shoulder at the lower end of the needle which is held on its seat by the pressure of the spring acting through the spindle. When the fuel pressure reaches the required injection pressure the needle valve lifts off its seat and the fuel is forced through the holes in the nozzle tip in the form of a finely divided atomized spray. At the end of injection the spring returns the needle valve on to its seat. The needle valve stem is a very accurate fit in the nozzle body but a small quantity of fuel leaks past the stem (thus providing lubrication) and is led back into the fuel system via the leak-off connection in the injector cap nut.

GP Pneumatic Governor. The Governor consists of the throttle control unit mounted on the air intake of the engine, the governor unit mounted on the injection pump, and the suction pipes connecting the two. The throttle unit is mounted between the engine air intake and the air cleaner and contains a butterfly throttle valve "A," which is connected to the driver's accelerator pedal or control lever. This throttle controls the speed of the engine, there being no direct connection between the driver's control and the fuel pump. Two ports "B" and "C" are arranged in the throttle unit so that when the throttle valve approaches the closed position one port is on the engine side and the other on the atmospheric side of the throttle. These ports are connected by the suction pipes to the governor unit. The governor unit is mounted on the end of the injection pump and comprises a housing containing a diaphragm which is attached to the pump control rod, and when the pump is at rest this is held in the maximum fuel delivery position by a spring. The diaphragm, which is a synthetic rubber moulding, is retained in the rear half of the housing by a steel plate and spring ring. At the opposite end of the housing are two ports "G" and "H" to which the suction pipes are connected. Port "G" is in direct communication with chamber "D," while port "H" communicates with the external annular groove in the damping valve guide "J." This annular groove is connected to the main chamber by cross holes communicating with the central bore of the guide "J" in which slides the damping valve which is attached to the diaphragm.

A stop level is provided which moves the pump control rod to the no delivery position when it is desired to stop the engine. Some types of governor units are fitted with a piston and employ a cup leather in place of the diaphragm, but the method of operation is the same. The suction pipe "M" connects the port "B" on the engine side of the throttle with the diaphragm chamber "D," via the port "G", and the auxiliary suction pipe "N" connects the port "C" on the atmospheric side of the throttle with this main chamber "D" via the port "H" and the damping valve guide "J."

When the throttle valve is moved to the closed position an increased suction is created on the engine side of the throttle valve. This is transmitted through the suction pipe "M" to the diaphragm which is drawn back against the pressure of the spring thus moving the pump control rod so as to reduce the fuel delivery. Closing the throttle, therefore, reduces the engine speed, while by opening the throttle the suction on the diaphragm is reduced so that the spring moves the pump control rod towards the increased fuel delivery position thus increasing the engine speed. If the throttle is held in a fixed position the engine will run at a correspondingly constant speed with a variation of only 5 to 10 per cent, between full load and no load on the engine. The governor is therefore of the variable speed type, for it will govern at any selected speed within the designed speed range of the vehicle. It is therefore equally suitable not only for vehicle engines but also for marine engines, tractors, etc., where a variable speed governor is usually essential. The purpose of the damping valve is to prevent hunting at idling speeds. This is accomplished by adjusting the valve guide "J," so that when the diaphragm is in the slow running position the tapered portion of the valve will admit air from the port "H" via the external annular groove and cross holes in the valve guide "J," into the chamber "D," if the diaphragm moves too far towards the stop position due to surges in the engine speed.

As the valve guide is connected to the auxiliary suction pipe "N," it is therefore at approximately atmospheric pressure. The damping valve therefore acts in the same way as a buffer spring and prevents excessive oscillations of the diaphragm at idling speeds. To understand this, consider the operation of the governor at maximum speed; that is, with the throttle valve fully open. The depression in the air intake will then be very small, and the maximum speed of the engine is determined by the increasing air velocity, which, as the engine speed increases, causes a gradually increasing suction on the port "B," and this, transmitted to the diaphragm, draws back the pump control rod and limits the speed of the engine.

A number of the larger engine builders have adopted Simms fuel injection equipment, and these include the British Motor Corporation who manufacture the Morris, Austin, and Nuffield tractor engines and the Ford Motor Co. who also fit it as standard equipment on all their diesels.

Schwitzer-Cummins Appointments

Eugene S. Wichgear — Kurt A. Beier

The Schwitzer-Cummins Company has announced two new appointments. Kurt A. Beier now has the position of vice president in charge of Engineering and research. Eugene S. Wichgear becomes general sales manager.

European Diesel News

By Hamish Ferguson

INTERNATIONAL BOAT SHOW. The first International Boat Show was held at Olympia, London, at the New Year. Previously a small section of the International Motor Show had been set aside for the display of small motor-driven craft but this new exhibition is designed to appeal to all those interested in yachting and cruising. Organized by the Ship and Boat Builders' National Federation, it was sponsored by the Daily Express.

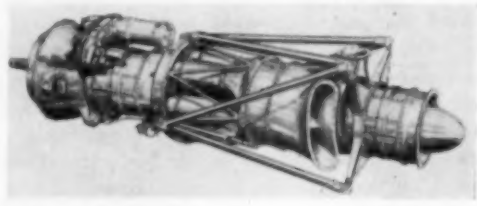
Engine builders having models on show included Bolinders Co. Ltd. of Sweden, (22 to 44 hp), Coventry Victor Motor Co. Ltd., (7 to 11 hp), W. H. Dorman & Co. Ltd., (29 to 98 hp), Fodens Ltd., (70 to 210 hp), R. A. Lister Ltd., (3½ to 54 hp), Henry Meadows Ltd., (60 to 214 hp), Parsons Engineering Co. Ltd., (36 hp), F. Perkins Ltd., (58 to 75 hp), Stuart Turner Ltd., (9 hp), and Turner Manufacturing Co. Ltd., (8 to 40 hp).

In all there were 28 diesels of which 22 were 4-cycle engines, the remaining 6 being 2-cycle. The smallest was the 3½ hp. air-cooled Lister and the largest the 214 hp. Meadows engine which is turbocharged. The Foden 210 hp engine is a 12-cylinder 2-cycle arranged in two banks of 6 cylinders.

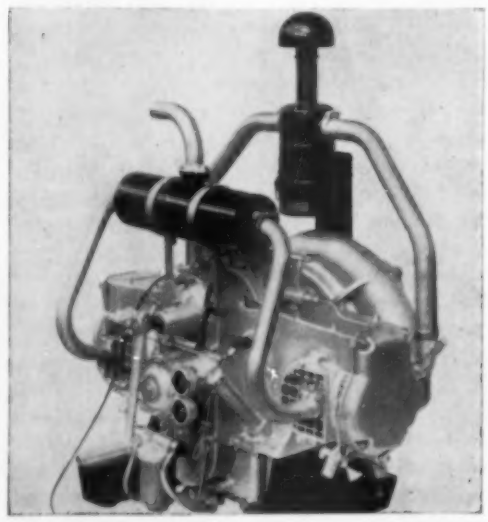
Yachting is a rapidly developing pastime in Britain and it is anticipated that the use of small-powered diesels will be extended in the future.

RUSTON YC DIESEL. Ruston & Hornsby Ltd. of Lincoln announce a new series of small vertical water-cooled industrial engines designated the YC series. They are made in 2, 3, 4, and 6-cylinder sizes operating at speeds from 1,000 to 1,500 rpm. The power range covered is from 16 to 72 bhp. They have been designed specifically to save space and provide easy accessibility with simplified maintenance.

FAIREY ROTODYNE. To meet the requirements of the Fairey Rotodyne, the Eland engine made by D. Napier & Sons Ltd. has been modified. An axial compressor is mounted co-axially at the rear of the engine and is supported by a tubular mounting which itself acts as the main engine mounting. An hydraulic coupling is mounted between the turbine and the auxiliary compressor in such a way that the power can either be taken through the propeller for forward flight or through the auxiliary compressor in the form of compressed air to the rotor for vertical flight. The engine is at present rated at 3,000 ehp.



A LARGER ENFIELD ENGINE. The cylinder size of the air-cooled engine produced by Enfield Industrial Engine Co., Redditch, has been increased and the new Enfield twin-cylinder "100" engine has a bore and stroke of 100 mm. with a compression ratio of 19.5 to 1. The speed range is from 1,000 to 1,800 rpm. Power output is 16 bhp continuous at the higher speed.



INTERNATIONAL I.C. ENGINE CONGRESS. The third International Congress is to be held at The Hague from May 23rd to 27th, 1955. The provisional program is that the inaugural session will take place on the 23rd of May, and on the 24th, 25th, and 26th there will be technical sessions both mornings and afternoons with social functions in the evenings. On the 27th of May there will be visits to engine works, shipyards and

installations in Amsterdam and Rotterdam. The two main subjects for technical discussion are to be: (1) Possibilities of the rail traction oil engine; (2) Possibilities of oil engine plant in groups of 10,000 hp and over on a single shaft, for stationary and marine duties.

LEYLAND BALLAST CLEANER. A larger and more powerful version of the well-known Matisa ballast cleaner is now undergoing service trials preparatory to going into operation with British Railways. Powered by the Leyland G.U. 680 engine, this new machine is 80 ft. in length and weighs 60 tons. The machines are designed as self-contained "on-track" units to clean the ballast which supports the railway track, and which loses much of its efficiency through the gradual fouling which takes place. The cleaner comprises two units; a bogey-mounted machine wagon and a two-axle wagon. The work of ballast cleaning is performed by the machine wagon which carries a continuous excavating chain, a screening plant, and a number of fixed and moveable belt type conveyors.

NEW VIS-A-VIS ENGINE. Coventry Victor Motor Co. Ltd. of Coventry have announced two new twin-cylinder, four-stroke, horizontal engines which are available either with water- or air-cooling. The smaller has a bore and stroke of 3.55 in. by 4 in. and develops 13.5 bhp at 1,250 rpm rising to 19.6 bhp at 2,000 rpm. The larger model has a bore and stroke of 3.74 in. by 4 in. and develops from 15.3 bhp to 24.6 bhp. These outputs are for the water-cooled engines, the air-cooled type being rated slightly lower at 12 to 18 bhp and 15 to 33 bhp respectively.

DAVID BROWN TRACTION CONTROL UNIT. David Brown Ltd. of Huddersfield have brought out a traction control unit the purpose of which is to increase the weight on the rear wheels of the tractor. Fundamentally it acts in a similar manner to water ballast in the tires, and wheel weights. The difference, however, is that the effect is achieved by the application of the principle of "moments" without the introduction of any additional weights, part of the implement weight being transferred to the rear wheels at the discretion of the tractor driver. Any desired increase in weight can be readily applied through the medium of a small control lever while the vehicle is in motion.

Tachometer Bulletin

Herman H. Sticht Co, Inc. has issued a new bulletin describing their dwarf type "Standco" vibrating reed tachometers and stationary type vibrating reed tachometers in splash-proof case for permanent mounting. These are further additions to Sticht's line of vibrating reed instruments.

Copies of Bulletin No. 770-B are available on request to Herman H. Sticht Co. Inc., 27 Park Place, New York 7, N.Y.

President of SAE

C. G. A. Rosen

Carl George Arthur Rosen, consulting engineer to the President of Caterpillar Tractor Co., and lecturer on the faculty of Stanford University, was inaugurated as the 1955 president of the Society of Automotive Engineers at the organization's annual business meeting. He succeeds William Littlewood, vice-president of American Airlines, Inc., who served during 1954. Mr. Rosen is a past vice-president of SAE and helped found the SAE Construction and Industrial Machinery Technical Committee. During World War II, he was a member of the Navy technical mission which investigated German developments in sustained under-water operations. He also served as chairman of the SAE Army Ordnance Advisory Committee, and has been a member of numerous other SAE activities. The election of 12 vice-presidents, a treasurer, and three SAE Councilors was also announced at the SAE business session. Robert Cass, White Motor Co., and William Littlewood, American Airlines, Inc., continue on the council as past-presidents.

Worthington Management Changes

Edwin J. Schwanhausser

Hobart C. Ramsey

Walther H. Feldmann

Thomas J. Kehane

Charles A. Butcher

Effective early this year, the following changes took place in the top management personnel of the Worthington Corporation. Hobart C. Ramsey, formerly president, became chairman of the board, succeeding Howard Bruce who had been elected chairman of the executive committee. Mr. Ramsey continues as chief executive officer. Edwin J. Schwanhausser, formerly executive vice president and member of the board of directors, became president of the corporation. Clarence E. Searle retired as vice-chairman of the board but continues as a director.

Walther H. Feldmann, formerly vice president in charge of sales, became executive vice president. He succeeded Mr. Schwanhausser. Thomas J. Kehane, formerly assistant vice president and general sales manager became vice president in charge of sales. Charles A. Butcher was named vice president for Planning.

Vice President

The election of A. R. Gaus as a vice president has been announced by E. H. Lang, president of Erie Forge and Steel Corporation. Before joining Erie Forge, Mr. Gaus was vice president of the Midvale Company, having been with Midvale 20 years.

Expands Region

The New York sales region of Electro-Motive Division of General Motors has been expanded to include the Jacksonville region and will be known as the Eastern region, it is announced by Paul R. Turner, director of sales of Electro-Motive. G. M. LaRiviere, regional manager at New York, will be manager of the new Eastern region. Charles L. Moss, Jacksonville regional manager, will become district sales manager at New York and B. K. Wingerter, district sales manager at Jacksonville, is transferred to a similar post in the Eastern region, with headquarters at the Halethorpe Branch at Baltimore, Md.

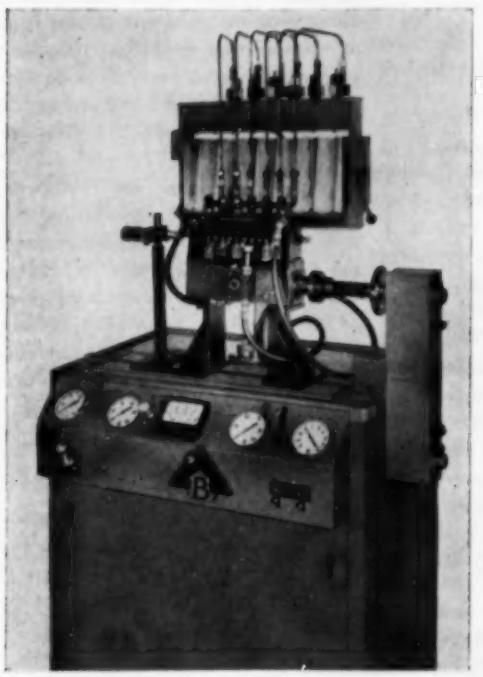
Opens New Atlanta Office

Richard Foster

Clark Bros. Co. of Olean, New York announces the opening of a new district sales office in Atlanta, Georgia. The office will be located at 685 West Peachtree Street, N.E. in Atlanta. Manufacturers of heavy duty engines, compressors and gas turbines for the petroleum, gas, process and general industry, the office was established to better serve industry in this rapidly expanding new territory. Opening the new Atlanta office and acting as district manager of the territory is Richard Foster. A graduate of the Georgia Institute of Technology, Mr. Foster possesses a wealth of experience in the heavy machinery field with particular emphasis on the oil, gas, air conditioning and refrigeration industries.

Mr. Foster has been engineering sales manager for the entire Clark line of products. His broad experience in all phases of engine and compressor design and application will now be available promptly throughout this new territory.

Fuel Pump Calibrating Stand



Bacharach Industrial Instrument Company, Pittsburgh, Pa. now has available a diesel pump calibrating stand which is said to be the first "universal" stand priced low enough to make it a sound investment for every shop handling fuel injection equipment even though the volume of such work is limited or the test stand is to be used primarily for selecting the pumps which should be returned to the manufacturer's service branch for rebuild.

According to the manufacturer, drastic price reduction has been achieved by a basically new design conception. The pump drive shaft is located below the bed plate extending from side to side of the stand. Transmission of power from the drive shaft to the pump coupling is accomplished by a power arm which can be changed from left to right side of the stand, thus making it possible to position left or right hand pumps so that the inspection opening in the pump housing faces outward for easy access to the internal parts. Another advantage of this method of power transmission is that speed adjustment is accomplished solely by mechanical means, instead of the combination of mechanical and electrical adjustments used heretofore. This makes the full 3 hp motor output available at the pump coupling over the entire speed range of 150 to 4000 rpm, whereas formerly only half of the rated horsepower was available at pump speeds below 1500 rpm.

Of special interest to shops now servicing various makes of pumps or planning to extend their fuel injection service at some later date, are the accessories available for this stand which according to the company represent the most complete assortment ever offered. Among these accessories are mounting brackets, test nozzles, drive couplings, fuel delivery lines and timing and positioning devices for all multi-plunger and distributor-type of pumps made by Bosch, CAV, Caterpillar, Cummins and International Harvester. The company also reports that additional accessories are being developed to adapt the stand for testing the new Cummins PT pump and the Roosa pump. Complete particulars are given in Bulletin 695 which is available from Bacharach Industrial Instrument Company, 7301 Penn Avenue, Pittsburgh 8, Pa.

Burgess-Manning Company-Penn Industrial Instrument Corporation Merger

The shareholders of Burgess-Manning Company, of Libertyville, Illinois, have formally approved a plan of merger under which Penn Industrial Instrument Corporation of Philadelphia, Pennsylvania will be merged into the Libertyville Company. The merger had previously been approved by the Penn shareholders at a meeting held January 21st. R. L. Leadbetter, president of Burgess-Manning, announced that the merger became effective as of the close of business January 31.

Burgess-Manning Company, which maintains divisional offices in Chicago and Dallas, Texas, in addition to its Libertyville office, will continue its present activities, which include the manufacture of industrial silencing equipment and architectural acoustical products. The Penn business, consisting of the manufacture of industrial instruments, including a full line of flow meters, will be continued as a division of Burgess-Manning Company. The Burgess-Manning shareholders also elected William C. Bennett and William Melas, the former principal executive officers of Penn, as directors of the merged company. The former officers of Penn will continue in direct charge of the Industrial Instrument Division.

Canada to Electrify Valley

The Provincial Government has authorized the British Columbia Power Commission to electrify the coastal Bella Coola valley of Canada. The Crown-owned utility will construct a 350-kilowatt diesel-electric generating station at Bella Coola at an estimated cost of $110,000, and a 13-mile distribution system at a cost of about $90,000. About 200 residential and commercial customers in the valley will receive their first central station electricity from the new system which is scheduled to be built next fall. Two 200 kw Caterpillar and one 100 kw Buda generating sets are to be moved in from the Hazelton station.

Approximately 60 customers will be served in Bella Coola Community, which is at the head of North Bentinck Arm, some 40 miles east of Ocean Falls. Another 60 homes on the Indian Reserve also will be electrified, with the remaining 80 customers being located at Hagensborg, 11 miles up the valley, and along the road linking the two communities. The electrification project is expected to stimulate the fishing and logging economy of the relatively-remote up-coast valley. The area already is optimistic over the progress being made on the road link with the interior of the province which now is passable in the summer only, but which ultimately will be an all-weather link.

Increases Capacity of Rear Dump

To meet the need for a greater capacity hauling unit in the size powered by the Model C Tournapull, LeTourneau-Westinghouse Company, Peoria, Ill., announces that the capacity of the new Model C Rear Dump has been increased from 18 to 22 tons. In terms of yardage, the struck capacity of the new unit now is rated at 14.7 yards, its heaped capacity 17 yards.

To provide for this greater load-carrying capacity the inside width of the Rear Dump has been increased 10 inches at the top. Its top length has been increased 2 inches. This increase in size is reflected in general dimensions of the Model C Tournapull Rear Dump. It is powered by either a GM 6-71, bhp 208; a Cummins HBIS-600, 200 hp, or a Buda 6DA-844, 200 hp diesel engine. The overall length of the entire machine in traveling position is now 30 feet, 9 inches longer than heretofore, while the wheelbase in the same position is 16 ft., 4 in., an increase of 6 inches. The gauge of the new rear dump (width center to center of tires) is now 9 ft., which is 8⅞ in. larger than before. Ground clearance of the Rear Dump now is 22 in.

Its forward speeds with constant mesh transmission range from 2.5 to 29.2 mph, with sliding gear transmission from 2.9 to 30.2 mph, at 2,000 rpm.

To Build Industrial Torque Converters

Borg-Warner Corporation, through its Long Manufacturing Division in Detroit, will build and market a line of industrial torque converters in 1955, T. J. Ault, Long Manufacturing's president and general manager, announced recently. "A torque converter, for maximum efficient results, should be tailored to the engine with which it is used and for the performance expected from it," Mr. Ault said. "This is so in our present day passenger cars but is not commonly true in industrial applications—principally because of the large variety of engines and because there is no reasonable production volume for any given unit."

David T. Sicklesteel, designer and builder of transmissions for over 20 years, will be manager of the Long Division's new industrial sales and engineering organization. He previously was director of the Products Development Laboratory. He will work with customers on the development of units to meet their requirements and on the utilization wherever possible of products now produced by other Borg-Warner divisions.

Seminar Stresses Product Knowledge

Eighty-five of The Trane Company's 260 field sales engineers recently increased their knowledge of the company's refrigeration and air conditioning products by attending the second annual engineering seminar at La Crosse, Wisconsin. During the three-day seminar, they heard nearly 30 technical and semi-technical illustrated talks. The seminar is part of a continuing educational program through which Trane's large sales organization is kept informed of new and improved company products, application of these products and industry trends.

M. L. Hoglund, manager of Refrigeration Sales and seminar director, told the visiting salesmen: "To sell successfully today, the major requirement is that we have a sound and thorough technical knowledge of our products and their most effective application." The talks included such subject matter as refrigeration piping and controls, motors and starters, heat pumps, and big building air conditioning. Tours of the new Trane laboratory "The House of Weather Magic" and of enlarged plant areas were also in the seminar program.

Elected Director

Revis L. Stephenson, vice-president of the United States Hoffman Machinery Corporation, New York, was elected a director of the company at the board of directors meeting held recently, it was jointly announced by William L. Pfeiffer, chairman of the board and Hyman Marcus, president of U. S. Hoffman.

Mr. Stephenson joined the Hoffman organization in 1936 as a mechanical engineer, advancing to general-manager of the Air Appliance Division in 1952. He was appointed vice-president in charge of the Industrial Equipment Divisions last year. "The election of Mr. Stephenson as a director reflects the growing emphasis which Hoffman is placing on its industrial products," stated the president, Mr. Marcus.

Mr. Stephenson, a graduate of Clarkson Institute of Technology, is a member of the Society of American Military Engineers, the American Society of Mechanical Engineers, the Engineers Club, and American Ordnance Association.

Tug Building Contract Awarded

The Baker-Whiteley Coal Company of Baltimore has awarded a contract to design and build another tug for their fleet to Thomas D. Bowes, M.E. of Philadelphia, Pa. and RTC Shipbuilding Corporation of Camden, N.J.

The craft will be powered by a Fairbanks-Morse OP 1600 bhp diesel engine and will be 101 feet in length. It will be the fifth tug of Bowes design to be operated by Baker-Whiteley and the second 101 ft. tug to be built by RTC for the same company.

Gulf Coast Diesel Notes

By Michael T. Pate

HUNT Tool Company, Houston, has bought through Cummins Sales & Service, Inc., of Houston, a model HRD-400 Cummins diesel, rated at 100 hp. The diesel will be used to power a stiff-leg mast for use in well servicing.

KERR-McGEE Oil Industries, Inc., of Houston, has bought through Stewart & Stevenson Services, Inc., a series 71, General Motors diesel, nominal rating 85 hp, which will be used to power a small drawworks the company plans to operate in exploration work in Cuba.

VALLEY Tractor Company, Hobbs, New Mexico, has bought through Waukesha Sales & Service, Inc., Houston, a model 180DLC Waukesha diesel to repower an agricultural tractor.

ROBERT H. Ray Exploration Company, Houston, has bought three Stewart & Stevenson ac generating sets. The 10 kw units are each powered by a series 71, General Motors diesel. The units are destined for auxiliary lighting service on the company's rigs.

EAGLE Hardware Company, Eagle Pass, Texas, has bought through White's, Inc., of Houston, two model UD 350 International Harvester 60 hp diesels which will be used to power irrigation pumps in service in the Rio Grande river valley.

MARINE Construction Company, Patterson, Louisiana, has secured from Stewart & Stevenson Services, Inc., two series 71 General Motors diesels, each rated at 165 hp. These diesels, equipped with 2:1 hydraulic reverse and reduction gears, will power a 38-foot steel twin-screw crew boat.

BROOKS Jean Lumber & Supply Company, Shreveport, Louisiana, has secured from Waukesha Sales & Service, Inc., of Houston, a model 6LRDBSU Waukesha diesel and plan to use the 526 hp unit to power a sawmill.

LAREDO Implement Company, Laredo, Texas, has secured from White's, Inc., of Houston, 2 model UD350, 60 hp, and two model UD525, 100 hp, International Harvester diesels, all four being destined to drive deep-well pumps in irrigation service in the Rio Grande river area.

LA FERIA Water Control & Improvement District, La Feria, Texas, has bought from the diesel division, Fairbanks, Morse & Co., a model 38F5¼, 375 hp, 1200 rpm engine to be used in water service.

BLUDWORTH Shipyard, Inc., Houston, has bought through Stewart & Stevenson Services, Inc., of Houston, two series 71, General Motors diesel marine propulsion units, each equipped with 1½:1 hydraulic reverse and reduction gear. The diesels are being installed in a 32-foot twin-screw crew boat which will be shipped to New Guinea for exploration work there.

PRESTON Guidry, New Iberia, Louisiana, has bought through Waukesha Sales & Service, Inc., of Houston, a model 135DKBS Waukesha diesel rated at 150 hp at 2000 rpm. The diesel will repower a truck tractor.

TECHNICAL Drilling Services, Midland, Texas, has bought four series 71, General Motors diesel engine units to drive Gardner-Denver WBK 600 cu. ft./min. compressors for air-drilling service. The diesels were purchased through Stewart & Stevenson Services, Inc., of Houston.

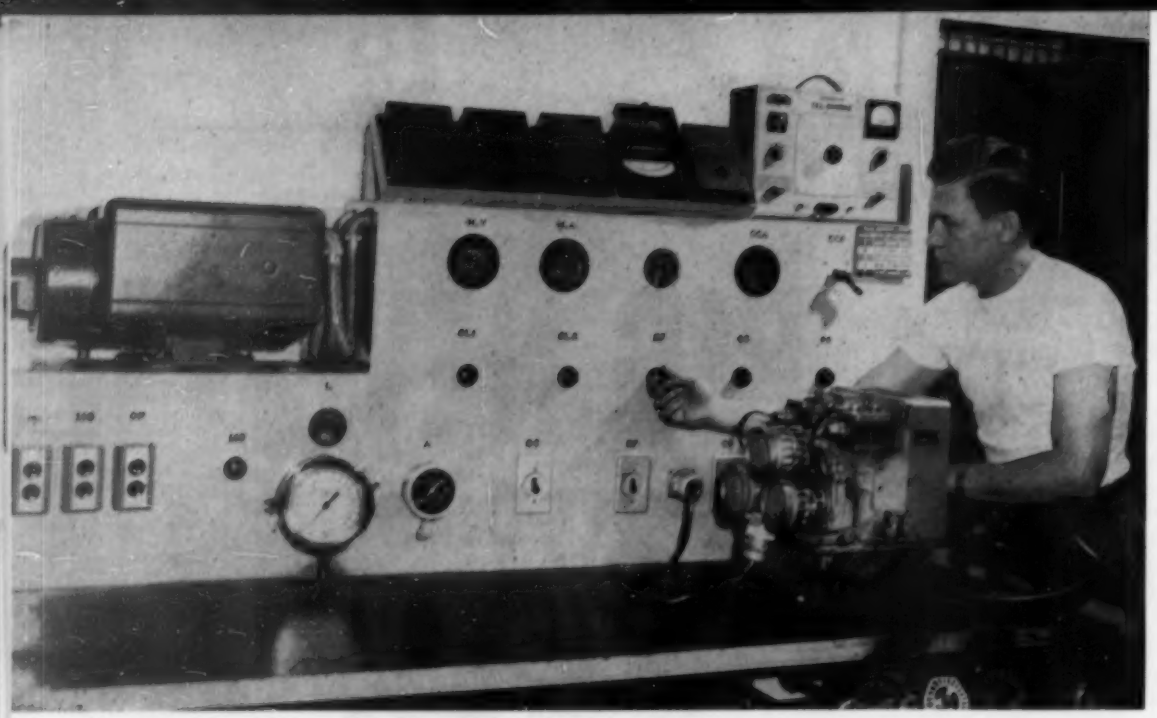
THE City of Teague, Texas, has bought through the diesel division of Fairbanks, Morse & Company, an 8-cylinder model 38, 1200 hp engine to be installed in the city's power plant.

Adjustable Speed Drive

A completely new adjustable speed drive, the Dynaspede Coupling, developed by the Dynamatic Division, Eaton Manufacturing Company, Kenosha, Wisconsin offers a number of design and operational advantages. The Dynaspede Coupling is a stationary field, liquid cooled, eddy-current adjustable speed power transmission device. Driven by a constant or variable speed power source, the Dynaspede Coupling delivers torque or speed to suit specific processing requirements.

The absence of all rotating electrical components—slip rings, brushes, commutators and coils—provides superior performance, reflected in reduced maintenance and adaptability to hazardous, moist, dirty and other adverse locations. Liquid cooling efficiently provides an effective heat transfer medium, permitting very wide speed ranges at constant or reduced torque and, under certain conditions, constant horsepower. Various types of easily applied controls, from an alternating current power source, provide step-less speed control and almost unlimited special process requirements.

Dynaspede Coupling construction details, capacities, curves, dimensions, efficiencies and advantages are described in the bulletin SF-1. A free copy is available upon request. Write to Dynamatic Division, Eaton Manufacturing Company, Kenosha, Wisconsin.



Operator's side of test bench in Missouri Pacific's electrical shop at Kansas City. Unit being tested is connected electrically with cable from left and through hose connections to oil and air pressure supplies.

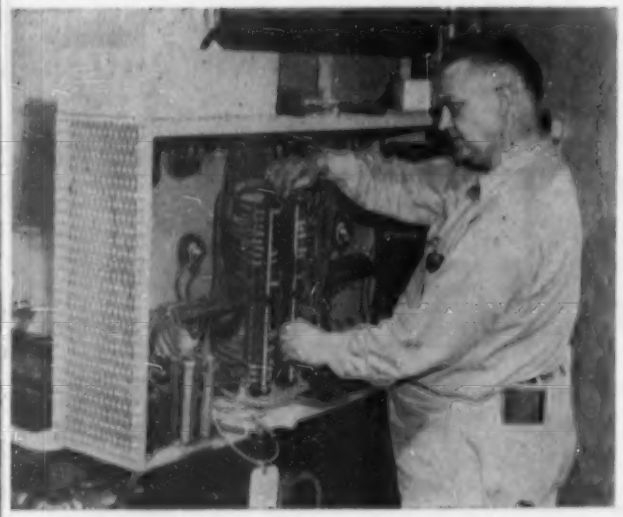
MOPAC GOVERNOR MAINTENANCE

By R. J. MAXWELL*

Experts in diesel locomotive operation and maintenance generally concede that the engine governor unit is second only in importance to the locomotive storage battery insofar as engine operation is concerned. The highly sensitive governors on the diesel engines of Alco locomotives are precision electro-hydraulic devices which must always be at the peak of perfection for good locomotive performance and control. But in normal use a governor's sensitivity deteriorates and hence requires periodical examinations and adjustments to restore the original, very essential sensitivity.

**In this article, Mr. Maxwell, of Missouri Pacific Lines, tells how MoPac solves some of its diesel problems, with specific reference to its governor maintenance program.*

Rear of test bench, showing intricate wiring being examined by W. C. Hardin, who developed the testing apparatus.



Test-benches are available commercially for this purpose, but Missouri Pacific Lines recently built one of its own in the electric shop of its diesel facility at Kansas City. It was developed by W. C. Hardin, MoPac's electrical foreman there. The relatively clear bench top and simple-looking backboard conceal an array of pipes and valves, and a formidable maze of electrical wiring. All this is by way of simulating the actual conditions of engine operation and providing the means to observe the behavior of governor units under test on the new bench.

Until the new test-bench became a reality there was no precise way of determining if governors were functioning within the permissible limits of their sensitivity. They were removed from locomotives on annual inspection basis, perhaps partially disassembled and cleaned, then returned to service. Now each unit is completely disassembled and magnafluxed for hidden structural defects. Operating parts are precisely measured, and if not within the limits of original dimensions, some as close as .0003 in., new parts are installed.

Controls on the test-bench simulate locomotive operating conditions, besides providing means for complete observation and accurate check of other factors affecting diesel performance. Shaft seals may be examined for possible oil leaks and power pistons checked for "blow-by." The number of degrees of rotation of the governor main shaft may be checked, and clutch arms may be tested for correct residual magnetism.

Operation of the speed and fuel limiting solenoids can be accurately observed and properly adjusted. When set up to check governor performance under varying conditions of engine loading, the test-bench instrument readings will reveal the amount of speed droop and corrections can be made on the governor to hold this falling-off to a minimum.

The test-bench incorporates an amplidyne exciter, model 5AM73AB263, to provide the variable characteristics that are encountered in actual engine operation. A compressed air-driven, 1800 rpm. motor, controlled by the governor, drives a 500 watt, 125-volt dc. electric generator, which simulates the output of the main generator of the diesel locomotive. A 2-pole tachometer generator, driven by a V-belt from the air-motor shaft, is used to measure speed and to operate the speed solenoid and the S.A.R. relay, the same as on the locomotive.

A motor-driven Tuthill oil pump furnishes oil for the power-piston operation. This includes an arrangement of valves to fill, run, or drain the governor. The test-bench has an oil storage tank of 10 gallons capacity with a large permanent magnet in the bottom to attract and hold stray metal particles, if any, which may have gotten into the oil system. Electric current at 75 volts dc. is supplied by a remote motor-generator. This voltage is used in the fuel limit circuits, here again simulating actual locomotive operation. Alternating current at 440 volts is supplied to the test-bench to drive the amplidyne.

The general view of the test-bench in an accompanying photograph shows the arrangement of meters and control knobs available to the operator to set up any combination of operating conditions. The amplidyne is at top left, with portable meters ranged along the top of the rear panel board. These meters are used to check balance currents, wheel-slips relays and other relays used on Alco engines. The capacitor tester is at top right. All these instruments are also used in conjunction with another test-board designed to check the speed control and excitation panels of Alco engines.

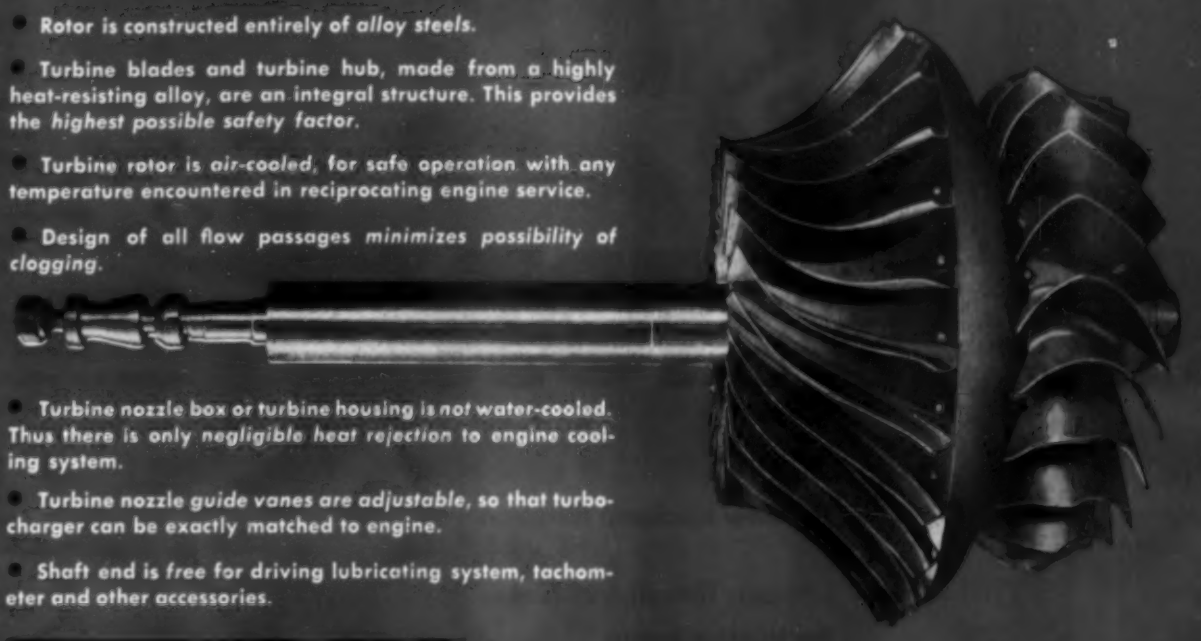
The permanently installed instruments include the voltmeter on the generator output, the ammeter for the generator current, potentiometer for generator and feed-back for amplidyne, the potentiometer for generator only, exciter field, clutch coil rheostat, speed setting potentiometer, milliameter for clutch coil, engine control switch, three push-buttons for motor-amplidyne, motor generator, and oil pump, and a knob to adjust the 75-volt dc. supply read on a voltmeter. The large dial is a laboratory gauge to set the oil pressure regulator in the governor, while next to it at right, is the air gauge for the air-motor. Switches are provided for the dc. voltage circuit, the exciter field circuit, and clutch-shorting. Hidden behind the governor unit is a control to de-sensitize the governor. The meter at top center is a conventional GE speed tachometer. Fuel limit and speed coils are set from readings with a portable milliameter. Hand valves at lower right, under the bench-top, control other operating phases of the test-bench.

While the test-bench was developed by Mr. Hardin and built under his supervision in the electric shop, A. J. Daniel, master mechanic for Missouri Pacific at Kansas City, gave his full cooperation and coordinated the work of various other shop crafts participating in the construction details.

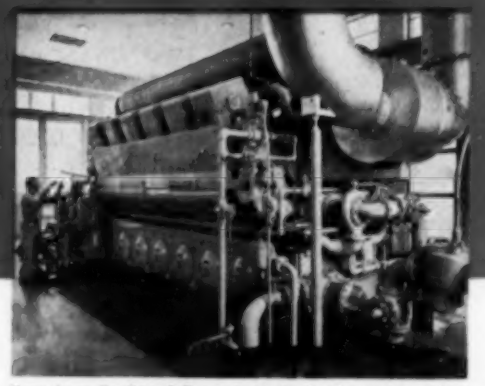
DE LAVAL
HIGH PRESSURE TURBOCHARGERS

increase output by 100% or more

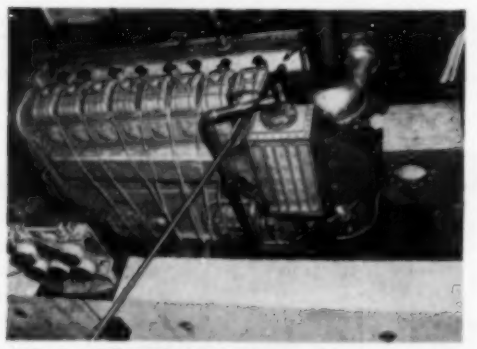
- Rotor is constructed entirely of *alloy steels.*
- Turbine blades and turbine hub, made from a highly heat-resisting alloy, are an integral structure. This provides the *highest possible safety factor.*
- Turbine rotor is *air-cooled,* for safe operation with any temperature encountered in reciprocating engine service.
- Design of all flow passages *minimizes possibility of clogging.*



- Turbine nozzle box or turbine housing is *not* water-cooled. Thus there is only *negligible heat rejection* to engine cooling system.
- Turbine nozzle *guide vanes are adjustable,* so that turbocharger can be exactly matched to engine.
- Shaft end is free for driving lubricating system, tachometer and other accessories.



Here is a De Laval Type A-14 Turbocharger installed on a V 12-cylinder, 4-cycle diesel engine.



A De Laval Type B-8 Turbocharger, shown on test, is mounted vertically on an 8-cylinder, 2-cycle diesel.

Exclusive
MONOROTOR
construction shows why

These De Laval high pressure turbochargers represent the newest development in diesel engine design. In many cases they can double the output of heavy-duty diesel, gas and dual-fuel engines without increasing thermal loading. • They offer pressure ratios of 3:1 as well as far higher compressor and turbine efficiencies than those found in conventional turbocharger systems.
• De Laval turbochargers are self-adjusting to engine loads, can be used on 4- *and* 2-cycle engines. *Write for Bulletin 8000* giving compressor curves and flow range diagrams.

DE LAVAL
Turbochargers

DE LAVAL STEAM TURBINE COMPANY
883 Nottingham Way, Trenton 2, New Jersey

DL-205

Florida Diesel News

By Ed Dennis

THREE Fairbanks-Morse diesels model 31-A-6¼-S with Fairbanks-Morse 125 kva generators, Woodward U. G. 8 governors and Air Maze breathers for power units at the S-5-A pumping station of the Florida Flood Control project. This is in addition to the six 1600 hp pumping units.

DIESEL Engine Sales Inc., St. Augustine, delivered to Sahlman Seafood Co. of Fernandina Beach, the 67 ft. *New Moon*. Engine room equipment included a D13000 Caterpillar, Twin Disc power take-off and a Delco Remy 1500 watt generator.

CUMMINS Diesel Engines of Florida supplied the model N. R. T. M.-600 diesels rated 300 hp at 2100 rpm for J. Ruppert Schalk's new 64 ft. yacht *Lindwood*. Capital H. Y. C. D. hydraulic reverse gears were also used. Launched at the Huckins Yacht Corp., Jacksonville.

BALD Eagle Construction Co. of Fort Lauderdale received a #41 Northwest crane powered with a 135 hp Murphy diesel from Florida-Georgia Tractor Co. who also delivered a Murphy powered #6 crane to North Dade Water Co.

FORT Lauderdale Water Works received two General Motors model 6-110 diesels for use in their pumping plant. Also a GM 2-71 was installed in a Buckeye ditch digger for Morris Prosser, contractor.

IN Coral Gables, Hooper Equipment Co., received a D6 tractor and a D8 cable dozer for construction work in the Everglades from Shelley Tractor & Equipment Co., Miami.

THE *Jannett B*, a Belcher Oil Co. tug, was repowered with a model 8-268-A Cleveland Diesel Division, General Motors engine; Westinghouse controls, for Florida coastal towing.

ONE OF the first vessels to start commercial tuna fishing operations in the Gulf of Mexico is the 105 ft. *Buccaneer* of Pensacola, Fla. Power is supplied by a 200 hp. Lathrop diesel and included in the engine room is an Onan Generating set with a Fairbanks-Morse generator. Capt. J. C. Mikkelson is skipper.

A PETTER diesel rated 7 hp was included in the engine room equipment on the newly launched *Lilly Jane*, built by Shrimp Boat Builders of Jacksonville. A Caterpillar model D337 with a Twin Disc power take-off was also included.

TWO ONAN diesel generating sets rated 3 kw for light plants on vessels owned by Hank Myers of Fort Myers, sold by Ellis Diesel Sales & Service of Ft. Lauderdale.

SHELLEY Tractor & Equipment Co. supplied the model D311 Caterpillar diesel power unit to be used in the refrigeration system on the freezer trawler *Shrimp King*, owned by A. A. Fagen Shrimp Co. of Tampa.

TWO Cummins diesels model JMS-600 with Capital R&R gears were installed in Mr. Rosenblat's new 40 ft. yacht being built in Chris's Boat Yard in Miami. The Sen Dure heat exchangers were especially cast for these engines.

AN ATLAS diesel, 6 cyl. 4 cycle developing 200 hp at 1200 rpm was installed on the newly launched 78 ft. trawler *Santos*, built by Shrimp Boat Builders at Jacksonville. Other engine room equipment included a Snow Nabstedt 3:1 r&r gears, Twin Disc power take-off and a one cyl. 7½ hp Petter diesel auxiliary for the Onan generator and the bilge pump.

Purchases Dual-Fuel Generating Sets

The City of Natchitoches, La., has placed an order with Baldwin-Lima-Hamilton Corp., Hamilton, Ohio, for two dual-fuel diesel engine generating sets. Each of the Model G-821-SA Hamilton, 8-cylinder, 21½ x 27½ inch, two-cycle engines has a net rating of 3,870 brake horsepower at 257 rpm and 74.7 bmep. The two units will increase the City's municipal power plant capacity by 5,500 kilowatts. The first engine is to be delivered and in service by June 1, 1955, and the second by Oct. 1.

Expands Operations Again

The Petter Diesel Engine Division of Brush ABOE, Inc. announces the opening of a branch office in Jacksonville, Florida. As of February 1st, Mr. Mathias Antz, well-known to Petter customers in the Northeast area, took over as regional manager of the new establishment, which is located at 1526 Hendricks Avenue. Mr. Antz is responsible for setting up further dealer outlets in Florida, Georgia, South Carolina, Alabama, Mississippi and Louisiana and from all indications this territory is one with a great deal of promise for the range of small Petter engines which have become popular in this country.

Portable Diesel-Electric Generator

A new, compact, portable diesel-electric generator unit for emergency, temporary or standby service has been introduced by the American Locomotive Company. Utilizing the type engine used on thousands of Alco diesel locomotives, the new generator can be equipped with a 9-in. x 10½-in., 4-cycle, turbocharged Alco diesel in sizes ranging from 390 to 1300 kw. In addition to the engine, all auxiliary equipment including generator, exciter and switch gear is mounted on skids so that by merely connecting the power cables, the unit is ready for operation. The entire power plant can be enclosed in a weather-proof housing eliminating the need for separate building facilities or protective structures.

Electric power fits into requirements for emergency or standby service better than any other type of energy because it can be adapted easily to most operations. Equipped with all necessary auxiliary equipment, the portable diesel-electric generator is particularly useful since it can be moved quickly and installed for all types of service. The new Alco unit is ideally suited to portable power requirements. Its skids, on which all of the equipment is mounted, are sufficiently rigid to permit operation without fear of misalignment of the crankshaft or generator shaft. Because of this rigidity, the unit can be installed on a concrete floor, making a large mass foundation unnecessary. A vertical-type radiator provides jacket water cooling with an ambient air temperature of 100°F. Thermostatic control of the radiator shutters is furnished to maintain the required jacket water temperature, and an expansion tank mounted above the radiator provides cooling water capacity. The crankshaft, flywheel and generator shaft are fitted with reamed through bolts, assuring a rigid coupling between these three pieces. The generator on the six-cylinder engine is a high-speed type with one outboard bearing mounted in the end shield. On the 12- and 16-cylinder units, the generator is of the engine type with a pedestal outboard bearing. The exciter is mounted on top of the generator stator and driven by Vee belts. Alternating or direct current generators can be provided with standard voltages.

The design of the Alco portable generator can also be adapted to pipeline service, flood control and irrigation uses by substituting step-up gears and pumps for electric generating equipment. Because of this versatility, the new Alco unit is extremely well suited to many types of portable power service.

New, Smaller Air Starting Motor

Ingersoll-Rand, one of the originators of air starting motors for diesel and large gasoline engines, announces a third size starting motor in their line. This new starting motor is known as the Size 5BM and is designed for starting service on gasoline engines with from 750 to 1750 cu. in. displacement and for diesel engines from 300 to 700 cubic inch displacement.

This new starting motor incorporates the time proven Ingersoll-Rand Multi-Vane air motor as the power source, and is directly connected by means of a splined shaft to the Bendix drive unit. This design eliminates gears and assures minimum maintenance. The bearings in the air motor are sealed to keep grease in and dirt out. Smaller and more compact than equivalent electric starters, the air starting motor gives reliable starting service at all times. It eliminates the necessity of generators, banks of storage batteries, and the costs of battery maintenance and replacement. It is not affected by climatic conditions, which often injure the insulation of electric starting motors because of deterioration of windings. For more information write Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. or your nearest I-R Branch office.

Hamilton Diesels for Liberty Ships

Baldwin - Lima - Hamilton Corporation, Hamilton Division, Hamilton, Ohio has been awarded the contract to furnish two 7-cylinder Hamilton diesel propulsion engines as part of the Maritime Administration's experimental program of upgrading the 1,500 ship Liberty Reserve Fleet. The contract was awarded through the Shipbuilding Division of Bethlehem Steel Company, which is converting the Liberty ship to geared diesel engine drive. A total of 6,000 shaft horsepower will be developed by the two 3,125 brake horsepower, 260 rpm, 7-cylinder, 21½ x 27½-inch, Hamilton direct reversing diesel engines, both of which will burn residual oil as fuel. Propeller speed will be 100 rpm.

The Hamilton engine's record of operating on heavy residual fuels in different installations was a factor in the award. The engines will drive the propeller through Westinghouse Electric Corporation electric couplings and reduction gear as an integrated propulsion system.

The Maritime Administration experiments are expected to yield data for economic studies of the advantages of replacing the old 2,500 horsepower reciprocating engine drive in the Liberty ships with more flexible and economical propulsion power. Initial plans call for the conversion of four ships. They will be fitted with a gas turbine, free piston gas generator-turbine, steam turbine and diesel engines respectively.

Packaged Torque Converter Units

Packaged engine torque converter units engineered for the three largest Caterpillar diesel engines, the D397, D386 and D375, have been announced by Caterpillar Tractor Co. One series of these new packages will be identified as D397-16-1, D386-16-1, D375-16-1. These units consist of the standard engine, radiator (suction or blower fan), three-stage torque converter, output drive shaft, rear support, torque converter fluid cooling system and torque converter fluid charging system designed in conjunction with the engine fuel system so that no special torque converter fluid is required.

The second series of these units are designated as D397-16-2, D386-16-2, and D375-16-2, which are identical to the 16-1 series except a disconnect clutch is

applied between the engine and torque converter. Optional equipment available for all of these units include engine mounted air compressors, output shaft governor drives, ledge mounted base, shallow and deep oil pans, structural steel bases and engine throttle air controls. Typical applications for which these units are adaptable include locomotives, oil field equipment, yarders, shovels and draglines. These package units are sold and serviced through Caterpillar's dealer organization.

Borg-Warner Appointments

Edward W. Clark, works manager of the Calumet Steel Division of Borg-Warner Corp. in Chicago Heights, Ill., has been elected a vice president of the division, it was announced by W. B. Caldwell, president of Calumet Steel. Mr. Clark will also continue to serve as works manager. He has been associated with the division since 1933 and for several years was plant superintendent.

The naming of William C. Vokolek as vice president and works manager of the Franklin Steel Division of Borg-Warner Corp. at Franklin, Pa., was also announced. Mr. Vokolek joined Borg-Warner's Calumet Steel Division in Chicago Heights, Ill., in 1926. He rose to become production manager of Calumet and was transferred to Franklin Steel, as works manager, in 1947 when Borg-Warner acquired that property.

Tugboat Delivered to Suez Canal

One of the most powerful tugboats in the world has been delivered to the Suez Canal Company for emergency salvage work in the canal. The twin-screw motor vessel *Edgar Bonnet*, built by L. Smit & Son of Holland is powered by two Smit-MAN diesel engines, each delivering 2250 bhp at 190 rpm to three-bladed KaMeWa controllable pitch propellers. The *Edgar Bonnet* is 154 feet overall, with a 39 foot beam. It has two rudders and inboard rotating screws.

This combination enables the tug to turn within its own length with one propeller ahead and the other astern, and with both rudders hard over.

In addition to the powerful engines and propellers, the *Edgar Bonnet* has a towing device which tends to eliminate sudden changes in the tow-rope pull.

This device incorporates a dynamometer enabling the captain to read the towing force at any given instant. With the engines developing full power, the dead pull is 53 tons ahead, and 36 tons astern. Maximum free-running speed of the *Bonnet* is 15½ knots.

Mist Collector

Dollinger Corporation has announced the new Electro-Staynew mist collector for eliminating oil mist and smoke at its source. Designed to be mounted on or near high speed grinding and cutting machines, the Mist Collector removes over 90% of oil mist and smoke and returns clean air to the shop. Completely self-contained, the unit provides a "packaged" ventilating system for individual machine tools.

The manufacturer reports many exclusive advantages are incorporated in three new models, including unit construction, ease of installation and advanced safety features. With the mist collector's unit construction, ionizing and collecting chambers are combined into one integral unit greatly simplifying maintenance since there's only one unit to service. Bulletin #420 describes the three Electro-Staynew Mist Collector models in technical detail and is available from the Dollinger Corporation, 11 Centre Park, Rochester 3, N. Y.

West Coast Diesel News

By James Joseph

SAUSE Brothers Ocean Towing Co., Garibaldi, Ore., has purchased two additional model 45, 5¼ hp diesel engines from Fairbanks, Morse & Co.

A BUDA 6DAMR-273 engine is being installed in an 18-ft. mill pond boat, being built by Portland's T. B. Cook Engine Co. for Stevenson Plywood of Stevenson, Wash.

VIC DIETZ, subcontractor of Trade Wind Trollers' fleet fisher operating out of Depot Bay, Ore., has taken delivery of two 6DAMR-273 Buda marine diesels. The fleet fisher is a twin-screw craft, carrying fishing parties.

BEND, Oregon's Brooks-Scanlon Co. has repowered an off-highway logging truck with a Buda model 6DA-844.

SHEPHERD Tractor & Equipment Co., Los Angeles, has designed and patented what it calls its "Shepherd Hydra-Steer" for Super C Tournapulls. The hydraulic steering control unit gives new directional stability plus added traction and production performance. A number of Hydra-Steer equipped Super C's are currently in use in the L.A. area.

ANOTHER recent Shepherd development: the M131 Bowl Extension Kit applicable to Caterpillar #20, #21 and #80 scrapers. This center method of bowl extension is accomplished by welding in high tensile steel (precut materials) to the center of the bowl structure. Result: 3.05 cu. yds. additional capacity. Also adds 18½ in. to scraper bowl length.

BOISE's Morrison-Knudsen Co. has powered a model 54-B Bucyrus-Erie shovel with a Buda 8DAS-1125 with Torcon converter.

LOS ANGELES' Anderson-O'Brien Co. recently delivered a GM model 8103 diesel unit to Bear Valley Ski Lift Co., near Big Bear Lake, to power their new ski lift. Unit, designed by Anderson-O'Brien, has special hydraulic controls which disengage the clutches and apply brakes to the ski lift. In emergencies, mechanism automatically stops entire operation within 3 seconds. Lift is controlled by manual push buttons from several remote points.

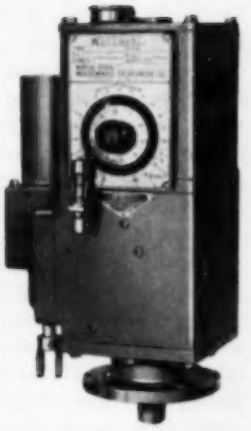
A LOS ANGELES inventor has come up with a device for de-smogging truck exhausts, including diesels. Exhaust gases pass through a tank of water prior to exiting through the stack. Inventor claims water collects exhaust residues, passes smogless, smokeless exhaust.

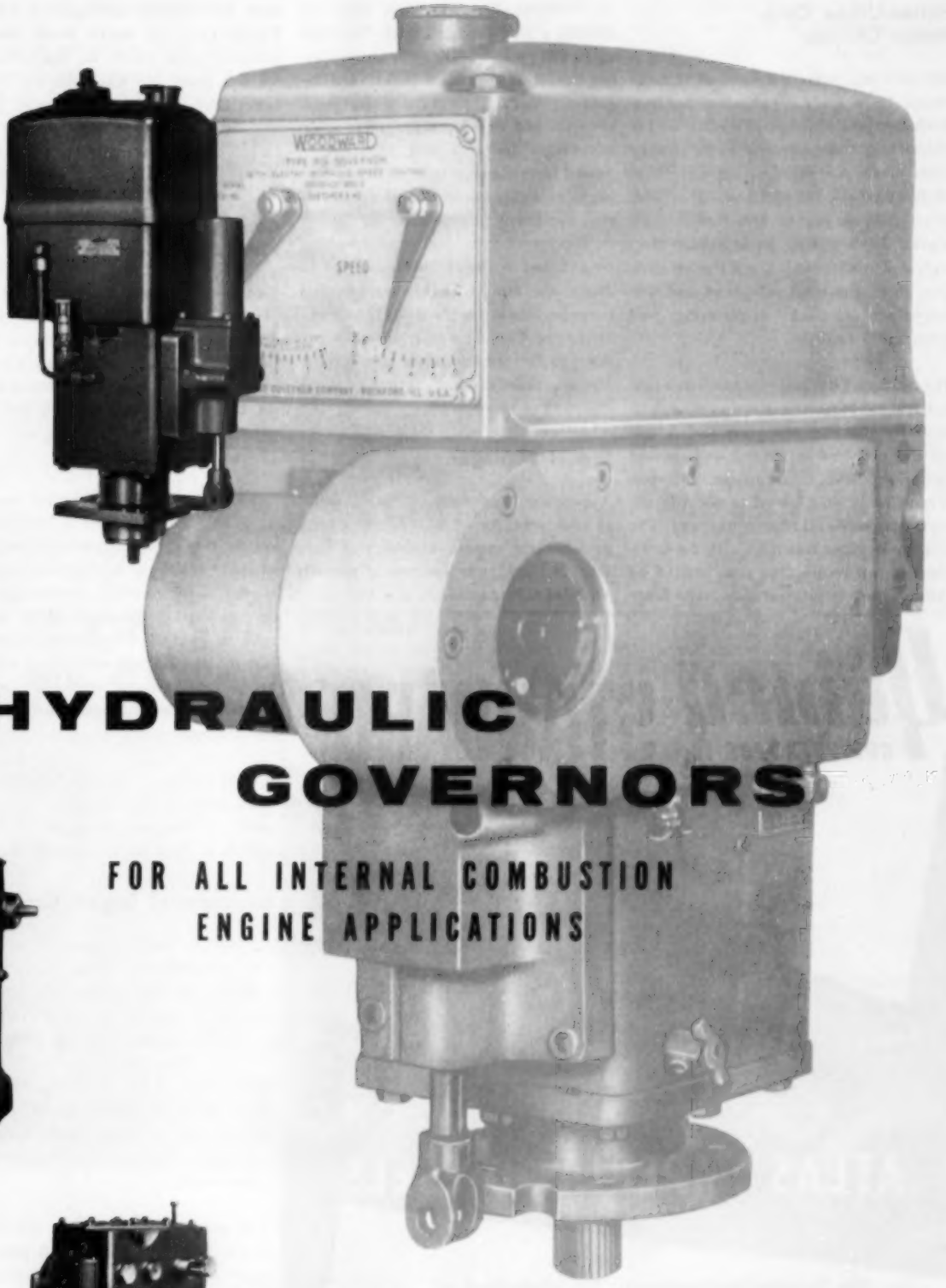
FAIRBANKS, Morse & Co. has sold a model 45D4⅛ diesel unit to Shoreline Diesel Maintenance Co., San Francisco, Calif., reports FM's C. E. Dietle, diesel division manager.

TO Los Angeles' Anderson-O'Brien Co., a U. S. Navy contract for two Model 6057 GM diesel units—engines are to be modified, used as training mock-ups for Navy diesel personnel.

FOR Wilmington, Calif.'s Metropolitan Stevedore Co., a GM 12103 power unit for driving a "super duper vacuum cleaner." The machine is a pneumatic elevating and conveying system for unloading grain, copra and like commodities from ships. System carries material several hundred yards from the vessel—dumps it into waiting trucks.

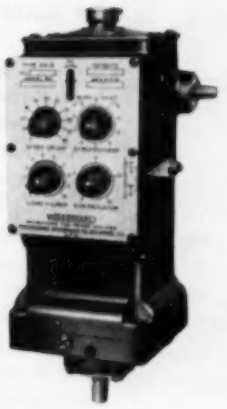
NORTHWEST diesel owners may be burning Canadian crude in late 1955, if present delivery schedules are met by Trans Mountain Oil Pipe Line Co., which hopes soon to be delivering 140,000 bbls of crude daily to refineries in Washington State. Eventually, TMOPL expects to supply 25 per cent of the Northwest's needs—including the raw tuff of diesel fuel—from Alberta.

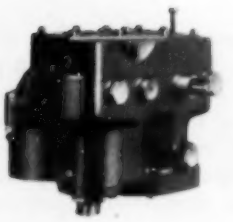


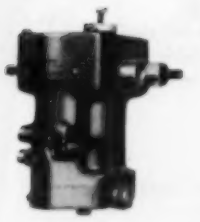


HYDRAULIC GOVERNORS

FOR ALL INTERNAL COMBUSTION ENGINE APPLICATIONS







WOODWARD GOVERNOR COMPANY

ROCKFORD, ILLINOIS

WORLD'S OLDEST AND LARGEST
MANUFACTURER OF HYDRAULIC GOVERNORS
FOR PRIME MOVERS

Honan-Crane Corp. Name Change

Effective March 1st, the name of Honan-Crane Corporation, Lebanon, Indiana is changed to Houdaille-Hershey of Indiana, Inc. Announcement of the change came from the parent company, Houdaille-Hershey Corporation, Detroit, Mich. Formation of this corporation marks the first step in Houdaille-Hershey's plan to establish a filtration division in its Lebanon subsidiary and will strengthen research, engineering and production facilities.

Honan-Crane has been operated as a subsidiary of Houdaille-Hershey Corporation for the past ten years and is one of the pioneers in the oil and coolant filtration fields. The name "Honan-Crane" will be retained to identify the new company's oil filter equipment. The change in name coincides with the introduction of a complete new line of oil filters and two new cartridge type filtering elements. All of the new filters, including a full flow unit with flow rates up to 800 gpm, feature new, quick-opening lids. A new pleated paper cartridge called "Flo-Pac", product of six years' research and development, offers many advantages for full flow filtration. A second filter element named "Kleer-Pac" provides highly efficient depth type filtration for detergent type oils.

In addition to Houdaille-Hershey of Indiana, the Houdaille-Hershey organization operates seven plants in the United States and Canada supplying many products to the automotive, aircraft, refrigeration, railroad and agricultural industries.

Export Manager

Appointment of Gerhard M. Rappich as sales manager of Borg-Warner International, the export subsidiary of Borg-Warner Corp., was announced recently. Mr. Rappich previously was vice president and general manager of United Export Corp. of South Bend, Ind., a company with which he was affiliated for ten years. He was with the Studebaker Corp. for more than twelve years, the last three as manager of the Car Order Department. His original export training was obtained in Germany.

Cookroc Packing and Piston Rings

The C. Lee Cook Company has just issued a 4-page bulletin in color which describes the Cookroc (laminated Bakelite) packing and piston rings. The bulletin describes the various types of Cookroc laminated plastic packing and compressor packing rings and gives applications.

The three types of material are the Standard, which is made of finely-woven cotton fabric and a chemical resistant phenolic resin, the Graphitized which is similar to the standard except that finely powdered graphite is added to the resin to give self lubricating properties, and the High-Temp which uses asbestos woven fabric instead of cotton plus special resins to increase resistance to higher temperatures.

A copy of the bulletin is available on application to the company, Write C. Lee Cook Company, 916 S. 8th St., Louisville 3, Ky. and ask for bulletin No. 500.

International Engine Congress

C. Fayette Taylor, professor of automotive engineering at the Massachusetts Institute of Technology, has been invited to participate in the International Internal-Combustion Engine Congress to be held at The Hague, The Netherlands, from May 23-28. This Congress was organized by the Association of Metal Industries of The Netherlands under the patronage of H.R.H. the Prince of The Netherlands.

The only contributor from the United States, Professor Taylor will present a paper on "Research, and Discussion Regarding the Relation of Cylinder Size to the Design and Performance of Diesel Engine Installations for Railway and Marine Service." His report is based on research carried out over the past ten years in the Institute's Sloan Laboratories for aircraft and automotive engines. Professor Taylor, winner of a U. S. Educational Exchange Grant, will be on leave of absence from M.I.T. during the spring term to lecture in mechanical engineering at Delft Technological University.

The International Internal Combustion Congress will have presented to it, twenty-eight papers which were selected out of a total of 43 submitted. The international "Papers Committee" is composed of the following gentlemen: Dr. W. J. Muller of Netherlands, chairman; Professor Dr. E. Sorensen of Germany; Dr. R. de Pieri of Italy; J. Messiez-Poche of France, and H. W. van Tijen of Netherlands.

Breather Filters Detailed

Its complete line of breather filters both "oil-wetted" and "oil bath" types, are illustrated and described in a new folder, now available from the Air-Maze Corporation, 25000 Miles Road, Cleveland 28, Ohio. The filters are designed for installation on crankcases of engines and compressors, gear cases, hydraulic equipment, liquid storage tanks, machinery housings, and other equipment. Design features include: large filter surface area, due to cylindrical design; vibration-proof filter media; ease of cleaning; approved flame arrester.

The free literature contains more than two dozen engineering drawings and photographs. One section is devoted to detailed specifications of all models. Another section highlights design and operating advantages. Copies may be obtained from the Air-Maze Corporation, 25000 Miles Road, Cleveland 28, Ohio.

To Build Mechanical Reefers

Santa Fe Railway has announced plans to build at its West Wichita, Kansas, shops during 1955 a total of 150 new mechanical temperature controlled refrigerator cars. At present the railroad has 30 of these cars in service and last month announced its intention to build 50 additional cars. Today's statement added 100 cars to that figure making a total of 180 of these cars to be in service by the end of 1955. All cars will be 50-foot, super-insulated refrigerators with loading capacity of 3,054 cubic feet. The cars are particularly designed for transport of frozen foods at zero or lower temperatures.

Pesco Products Division Appointment

R. G. Allen, president and general manager of Pesco Products Division, Borg-Warner Corporation, has announced the appointment of J. M. Vinicombe, Jr. as director of Industrial Relations. Prior to coming with the Pesco organization, Mr. Vinicombe was associated with Radio Corporation of America, in Harrison, N. J., and the Great Lakes Carbon Corp. in New York. He is a graduate of Hofstra College in Hempstead, N. Y., and attended the New York University Graduate School of Business Administration.

FPC Approves Gas Transmission on Pipelines

Natural gas for the Pacific Northwest made a step forward in mid-February when the Federal Power Commission approved the financing plan submitted by the Pacific Northwest Pipeline Corp. The Securities and Exchange Commission now will be asked to approve details of the plan for financing the $163,000,000 gas transmission line from New Mexico to the Canadian border near Bellingham, Washington. Manufacturers of diesel engines and other transmission equipment and supplies have been watching the unraveling of legal entanglements with great interest. The Northwest is said to be the only major area in the country that now lacks natural gas. Construction of the pipeline and related facilities will provide a considerable stimulant to manufacturers' activities.

Purchases Nordberg Gas

The Houston, Texas Gas and Oil Corporation has announced the purchase of fifteen Nordberg gas engines developing 3,500 hp each, for service on a gas transmission line to extend from Louisiana to Florida. The engines will each drive a DeLaval centrifugal compressor and will be utilized for compressor service. The pipe will be 34-in., 32-in. and 30-in. diameter. These engines are of the "V" type with 16-cylinders, spark ignition and the Supairthermal system of operation.

Repowers Tug

The B & M Towing Company, Houston, Texas, has announced that it will repower its M/V *Mary B* with two 10-cylinder Fairbanks-Morse opposed-piston diesel engines. The vessel was formerly known as the *Twin Cities* and was purchased in June 1954 from Lake Tankers Corporation by the B & M Towing Company.

Assistant Chief Engineer

Howard R. Cook, formerly supervisor of the Technical Department of Cleveland Diesel Division of GM, is now assistant chief engineer of Advanced Diesel Engineering, International Harvester Co.

Wisconsin Distributor

Appointment of the Cunningham-Ortmayer Company of Milwaukee, Wisconsin as distributors of General Motors Diesel engines has been announced by the Detroit Diesel Engine Division of General Motors. The Cunningham-Ortmayer Company has established complete factory-approved sales and service facilities at 2016 West Cornell St. in Milwaukee and will represent the Detroit Diesel Division throughout the state of Wisconsin.

Director of Engineering

Thomas W. Johnson has been appointed director of engineering of the New York Air Brake Company, it was announced by Charles T. Zaoral, president. Mr. Johnson will be in charge of engineering of the company's five divisions: Kinney Manufacturing Co., Aurora Pump Co., Dudco Division, Hydreco Division and Watertown Division, makers of hydraulic, liquid and vacuum pumps.

Prior to his new appointment, Mr. Johnson was assistant to John G. Wood, the company's executive engineering consultant. Mr. Wood will continue in this capacity.

Mr. Johnson was with the Eclipse Pioneer Division of Bendix Aviation Corporation for six years before becoming associated with New York Air Brake. While affiliated with Bendix Aviation, he was senior research engineer in charge of a department of 130 engineers and technicians. Varied experience with this company covered product design and development, administration, sales-engineering, tooling and production.

Mid-Continent Diesel News

By **Jack F. Cozier**

SINCLAIR Oil & Gas Company has purchased two 60 kw Murphy single phase generator sets from the Murphy Diesel Company, Tulsa, Oklahoma, for an offshore drilling rig located in the Gulf of Mexico. The Murphy diesel electric sets will furnish power for the living quarters.

CONTINENTAL Supply Co. has purchased two 8MO-1290 Buda gas engines for delivery to Gabbert-Jones Drilling Co., Wichita, Kansas. The two units were sold by the Buda Engine & Equipment Co., Tulsa, Oklahoma, for an Emsco rig.

PRODUCERS Chemical Co., Borger, Texas, has just bought a GM 2-71 diesel engine for powering a reciprocating pump from the Diesel Power Co., Tulsa, Oklahoma.

KNIGHT Mfg. & Supply Co., Tulsa, Oklahoma, has purchased from the Buda Engine & Equipment Co., Tulsa, Oklahoma, one 8PC-2505 Buda gas engine for gas compressor service.

HINRICHS Construction Co., Tulsa, Oklahoma, an International Harvester TD-24 tractor powered by an International Harvester UD-1091 diesel engine. The unit was sold by the Clarence L. Boyd Co., Tulsa, Oklahoma.

PRUCKA Transportation Co., Omaha, Nebraska, has in operation an Autocar tractor powered by a Cummins NHB-600 diesel engine.

JENNINGS Engine Supply Co., Oklahoma, has purchased an 8PC-2505 Buda gas engine for drilling and service in Southern Oklahoma. The unit was sold by Buda Engine & Equipment Co., Tulsa, Oklahoma.

MANHATTAN Construction Co., Muskogee, Oklahoma, have repowered a Manitowoc model 2000-B crane with a Murphy diesel model 11 power unit. The Murphy was sold and installed by the Wylie-Stewart Machinery Co., Tulsa, Oklahoma.

KNIGHT Mfg. & Supply Co., Tulsa, Oklahoma, has purchased two 8MO-1290 Buda gas engines from the Buda Engine & Equipment Co., Tulsa, Oklahoma. The units will be used for gas compressor service in Osage county, Oklahoma.

BERG & Buck Drilling Co., Shawnee, Oklahoma, has in operation two Buda 8MO-1290 gas engines operating through torque converters on a Brewster model N-45 drilling rig.

ASHLEY'S Inc., El Paso, Texas, has in use an Autocar tractor powered by a model HRBB-600 Cummins diesel for hauling all over the southwest and to the west coast.

Diesel Fuel Storage Test

Preliminary studies at the Naval Research Laboratory using a light scattering technique indicate it may be possible to predict after a test period of a few days, how various fuels will stand up under extended storage periods. The technique, which makes use of the fact that sub-microscopic particles suspended in the fuel will scatter light passed through the liquid, appears potentially useful also in evaluating fuels stability additives.

Engineering Paper on Filter Facts

"Color is no indication of oil condition." This is just one of many interesting facts set forth in the new 12-page engineering paper entitled "Fundamentals of Filtration." The paper is the first one of a series based on factual engineering data concerning filter facts. They are being prepared by Engine Life Products Corporation of El Monte, Calif. Comprehensive details concerning filtering equipment and its relation to the following subjects are covered: The Lubrication System; Contaminants and the Damage They Do; Filter Materials; Limitations of Chemical Filters; Filter Construction; The Modern Filter in Relation to Detergent Oils; The Filter in Relation to Engine Fuel, and Conditions Affecting Size of Filter and Type of Installation.

Engine Life's purpose in preparing these engineering discussions is to offer help, through service and knowledge of filter installation problems, to the engine manufacturer as well as to the operator. Copies of this new and highly interesting paper may be obtained by writing Engine Life Products Corporation, El Monte, California, and requesting Filter Facts No. 1. Fundamentals of Filtration.

New Brochure

A new brochure describing the operation of General Motors "6-110" diesel engines and illustrating industrial and marine models in the series from 200 to 575 horsepower is ready for distribution by Detroit Diesel Engine Division distributors and dealers. Entitled "Power For Progress," the brochure covers features of design, specifications and power curves for single-, multiple-engine and torque converter units and includes photos of these engines at work in various types of equipment.

Efficiency Plaque To Be Awarded

REA plant operating personnel and board members from throughout the country will gather at the Shirley-Savoy Hotel, Denver, Colo., May 2-3-4-5 for the REA Electric Generating Plants Sixth Annual Operation & Maintenance Conference. The feature of the first day's session will be a joint meeting of the diesel and steam sections at which the DIESEL PROGRESS Efficiency Plaque will be awarded. For the fourth time, the presentation will be made by the donor, Rex W. Wadman, Publisher and Editor of DIESEL PROGRESS. The award is made annually to the "most efficiently operated of all REA internal combustion plants." The first plaque, for 1951 operations, went to the Graham County Electric Co-op of Pima, Ariz. The last two years, honors have gone to the Wolverine Electric Cooperative, Hersey, Mich. A contest rule eliminates from consideration any plant that has won two consecutive years.

Harry F. Collins, general chairman, has announced a program that includes the following sessions of interest to diesel plant personnel—Operation and Maintenance Panel; Pressure Indicators; Piston Rings and Their Influence on Operation, presentation by Daros American Corp.; Operating & Maintenance Problems, a round-table for operators; Heavy Fuels.

Subjects of joint diesel-steam sessions include—Electrical Equipment Maintenance; Significance of Insulating Oil Testing and Handling; System Operation; and Reactive and Power Factor.

Elected Mack President

P. O. Peterson

P. O. Peterson, newly elected president and chief executive of Mack Trucks, Inc., formerly was executive vice president of Studebaker-Packard Corporation of South Bend, Indiana. The new president of Mack has spent his entire career in the automotive industry, having joined Studebaker in 1919 and being active since then in every phase of that company's business. E. D. Bransome, until now president and chairman of the board of Mack, continues as chairman.

Time Delay Relay

A compact new silicone-controlled time delay relay embodying many design improvements has been announced by the Heinemann Electric Company, Trenton, New Jersey. Designated as the Type A Silic-O-Netic Relay, it is available with standard timings from ¼ to 120 seconds. Variable flux operation, caused by the changing relationship of a solenoid coil and its core, produces highly definitive contact action. The Type A Silic-O-Netic Relay utilizes the Heinemann hydraulic-magnetic principle, in which a silicone fluid is the basis of time delay. A movable iron core, hermetically sealed in a non-magnetic metal tube extending through a solenoid coil, is drawn into the magnetic field resulting when the coil is energized. The silicone fluid slows the rate of core travel, thus controlling the response time. Contacts are actuated as the core touches the pole piece and check valve construction within the core allows faster resetting of the relay.

Silic-O-Netic Time Delay Relays are furnished with coil ratings from 24 to 240 volts, ac; 6 to 125 volts, dc. Complete information is in Bulletin T-5002, available from the Heinemann Electric Company, 404 Plum Street, Trenton 2, N. J.

Consolidate Gardner-Denver and Keller Tool

Managements of the Gardner-Denver Company, Quincy, Illinois, and of the Keller Tool Company, Grand Haven, Michigan, have announced that the stockholders of both companies have approved a consolidation. Keller Tool Company now becomes the Keller Tool Division of Gardner-Denver Company and will continue operations under the former Keller management.

E. V. Erickson, president of Keller Tool Company, has been elected an executive vice-president of Gardner-Denver Company; Gifford V. Leece remains as president of Gardner-Denver.

Knudsen New Head of Detroit Diesel

Semon E. Knudsen

William T. Crowe

Harlow H. Curtice, president of General Motors, has announced the appointment of Semon E. Knudsen as general manager of the Detroit Diesel Division of General Motors, effective March 1. Mr. Knudsen, son of the late William S. Knudsen, president of General Motors from 1937 to 1940, succeeds William T. Crowe, who is retiring after 35 years' service with General Motors. Mr. Knudsen goes to Detroit Diesel from GM's Allison Division where he has been manufacturing manager for aircraft engine operations since December 1954. He has been at Allison, which has headquarters at Indianapolis, Ind., since February 1953.

Born in Buffalo, N. Y., October 2, 1912, Mr. Knudsen attended Dartmouth College and is a graduate of Massachusetts Institute of Technology in the class of 1936. After three years experience with Detroit machine shops, Mr. Knudsen joined General Motors as a process engineer at Pontiac Motor Division. At Pontiac, he was successively chief inspector-defense plant, superintendent of the car assembly plant and assistant general master mechanic before he was appointed director of the Process Development Section of General Motors in August 1949. Mr. Knudsen was transferred to the Allison Division in February 1953 as assistant manufacturing manager of Aircraft Engine Operations and he was appointed manager on December 1, 1954. A member of the American Society of Tool Engineers and Society of Automotive Engineers, Mr. Knudsen also is a director of the Boys Club in both Detroit and Indianapolis. Mr. and Mrs. Knudsen have a home at 31500 Bingham Road in Birmingham, Michigan. They have three daughters, ages 15, 10 and 8 years and one son, age 14.

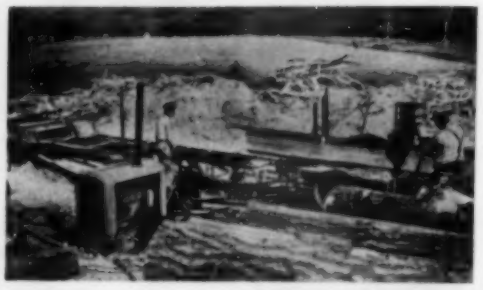
Mr. Crowe has been general manager of Detroit Diesel since formation of that division on January 1, 1938. He began his General Motors career in 1920, serving until 1925 as chief engineer of the engine division of General Motors of Canada, Ltd., at Walkerville, Ontario. He joined General Motors Export Division in 1925 and was manager of its Detroit office for a year. Then he was assigned to study automobile manufacturing in Germany and England. He did important work in design and manufacture of the Opel car in Germany and the Vauxhall in England, both produced by General Motors. In 1929, Mr. Crowe became executive engineer on product study for the General Motors engineering staff. He remained in that position until his appointment as General Manager of Detroit Diesel.

Assistant Sales Manager

Paul D. Sullivan

Paul D. Sullivan has just been named assistant sales manager according to an announcement by J. E. Heuser, general sales manager, Le Roi Division. Sullivan will headquarter in Milwaukee moving from New York where he has been in charge of contractor sales since joining the Le Roi Division of Westinghouse Air Brake Company more than a year ago. He will be concerned primarily with promoting the sale of Le Roi portable air compressors and Westinghouse stationary air compressors, both manufactured by Le Roi Division in Milwaukee.

Portable Sawmill



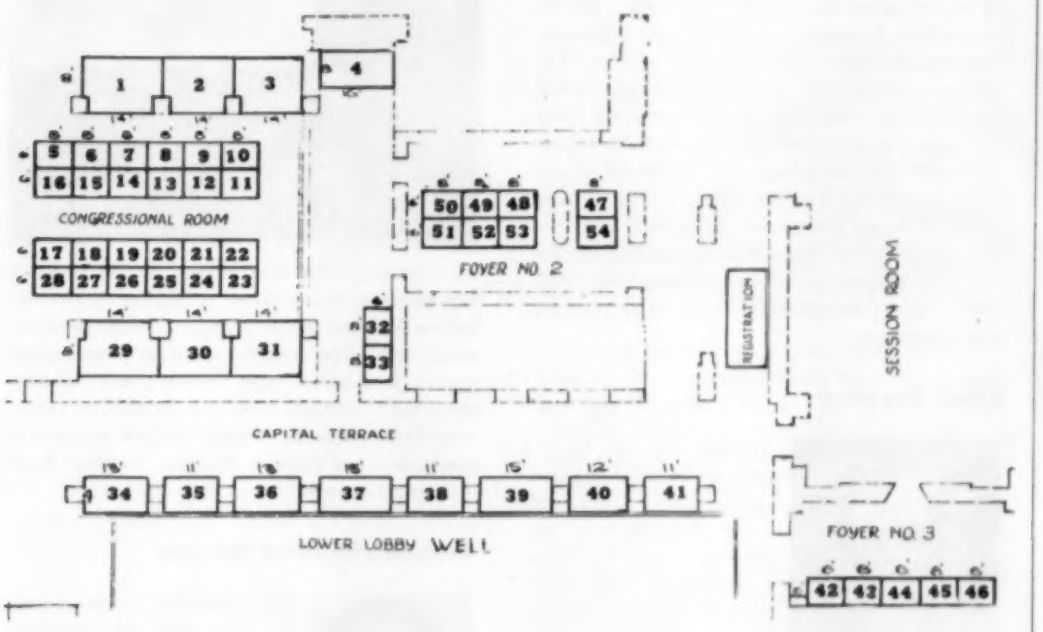
Portable sawmill operating near Columbia Falls, Montana where huge operation to salvage millions of feet of beetle-infested timber is going on. Mill, owned by R. C. Teets of Columbia Falls is a 54 in. Corinth and a 36 in. edger powered by a four-cylinder GM diesel engine. Output totals 20,000 board feet per day.

Oil and Gas Power Division Conference

"Oil and Gas Power for National Defense" is the theme for the 27th annual conference and exhibit of the Oil and Gas Power Division of the American Society of Mechanical Engineers. The meeting will be held June 6-9, inclusive in Washington, D.C. at the Statler Hotel. An attendance of more than 700 is expected by John A. Worthington, general chairman. Fifty exhibitors will fill to capacity the display facilities of the Statler's Congressional room.

Shown here is the floor plan of the exhibition area, and the rate schedule for the various booths. Exhibitors desiring to reserve space at the Conference should mail their reservations immediately to John A. Worthington, P.O. Box 626, Baltimore 3, Md.

1 – $400	12 – $180	23 – $180	34 – $305	45 – $180
2 – 400	13 – 180	24 – 180	35 – 260	46 – 180
3 – 400	14 – 180	25 – 180	36 – 305	47 – 180
4 – 375	15 – 180	26 – 180	37 – 350	48 – 180
5 – 180	16 – 180	27 – 180	38 – 260	49 – 180
6 – 180	17 – 180	28 – 180	39 – 350	50 – 180
7 – 180	18 – 180	29 – 400	40 – 280	51 – 180
8 – 180	19 – 180	30 – 400	41 – 260	52 – 180
9 – 180	20 – 180	31 – 400	42 – 180	53 – 180
10 – 180	21 – 180	32 – 180	43 – 180	54 – 180
11 – 180	22 – 180	33 – 180	44 – 180	



Old Timer

After the equivalent of more than 18 years of normal usage, a 20-ton Baldwin diesel-hydraulic industrial locomotive is still giving top performance in the Neville Island yards of Dravo Corporation. Purchased in 1942, this Baldwin-Lima-Hamilton Corp. locomotive was kept on 24 hour duty during the war years transporting heavy loads of steel and fabricated parts and supplies between shop buildings and shipyard. Loads frequently consisted of from 130 to 170 tons gross train over trackage which, in some places, has a grade of 3%. Many of its points of pickup and delivery were in areas of heavy sand-blasting operations. Even though running gear and engine were exposed to this abrasive sand and dusty atmosphere, its service availability during the years of 1942 to 1945 was three times the normal expected use of a yard locomotive.

Since the purchase of a new and larger Baldwin, a 40-ton unit powered by a 243 horsepower Cummins diesel, the old unit still serves as a dependable stand-by when the new locomotive is out for inspection. Two-way radio communication between the locomotives and dispatching center provides for speedy response to yard shifting requests.

Venezuela Bound

Nested on the deck of the Alcoa Steamship Company's SS *Polaris* bound for Lake Maracaibo, Venezuela is one of the two 45-ft. diesel tugs recently sold to Construction Aggregates Corporation by Equitable Equipment Company, New Orleans. Delivery of the two tugs was made within four days after receipt of the order.

Assistant to President

George E. Bowdoin

Mr. George E. Bowdoin, former president of U. S. Hoffman Machinery Corporation, has joined Worthington Corporation as assistant to the president, it was announced by Edwin J. Schwanhausser, president. Mr. Bowdoin was associated with U. S. Hoffman Machinery Corporation in various official capacities for twenty-four years. During World War II, he served for three years in the First Marine Division and participated in the landings at Cape Gloucester and at Peleliu.

Dieselization in Ireland

Ireland's rail transport system is now well advanced on a program of complete dieselization, according to T. C. Courtney, chairman of Coras Iompair Eireann (Ireland's Transport Co.), Dublin. The conversion from steam, as the means of rail traction, Courtney said, took definite form recently when CIE signed a $13,395,000 contract with Metropolitan-Vickers Electrical Co., a British firm, for 94 diesel-electric locomotives. In addition, CIE plans to build 19 diesel locomotives at its own Inchicore Works at a cost of $42,000 each, plus 340 coaches and 3,500 freight cars, which will bring to $30,000,000 the cost of the capital development program for new equipment.

Chief Engineer

C. V. Crockett

Appointment of C. V. Crockett as chief engineer of the GMC Truck and Coach Division was announced recently by Philip J. Monaghan, vice president of General Motors and general manager of the division. Mr. Crockett, former chief engineer of the Cadillac Cleveland (Ohio) Tank Plant, succeeds C. J. Bock, who is on leave of absence due to illness. He is well-qualified to step into an engineering position that has, in the past, guided the development of one after another important engineering "firsts" in GMC truck and GM coaches. He is a member of the Society of Automotive Engineers, Alpha Tau Omega and the American Ordnance Association. Crockett was born in Shelbyville, Ind., in 1902 and attended public schools there.

Torcon Torque Converters

An eight-page, four-color catalog describing Clark Equipment Company's line of Torcon torque converters is now available. Extensively illustrated, the brochure depicts models, shows attachments for specific adaptations, and describes, with cutaway drawings, construction of the converters. Copies may be obtained by writing to Clark Equipment Company, Transmission Division, Falahee Road, Jackson, Michigan.

Cummins Regional Manager

J. P. Jung

Cummins Engine Company, Inc., of Columbus, Indiana, announces the appointment of J. P Jung, as regional manager, Southeastern region, with headquarters at 805 Peachtree Street, N. E., Atlanta, Georgia. Mr. Jung has been associated with the company since February, 1947. He served 4½ years as assistant regional manager Great Lakes region at Cleveland, and for more than a year in the same capacity in the Southwest regional office at Los Angeles. Mr. Jung replaces R. P. Parshall who has moved to Milwaukee to take over the Cummins distributorship as president of Cummins Diesel of Wisconsin, Inc.

Electric Tachometer for Diesels

A new Sun mechanical drive electric tachometer for diesel engines is now available from Sun Electric Corporation, Chicago, Illinois. The new Sun electric tachometer mechanical drive and transmitter unit is easy to install, and is adaptable to most diesels in commercial and marine service. There are no drive cables. Tachometer head may be installed 50 to 100 feet from engine. Operation is simple. New Sun power units are available for standard S.A.E. drive ratios and S.A.E. standard mechanical drive outlets.

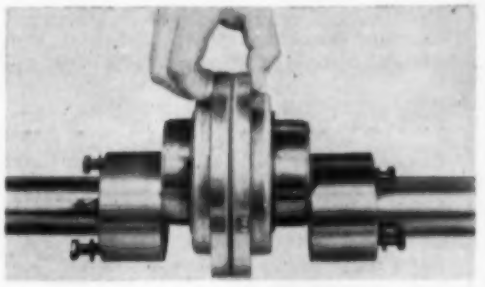
The Sun tachometer head has illuminated dial with adjustable arrows to indicate safe, economical rpm range. Jeweled D'Arsonval movement, powerful Alnico magnet and rugged double bridge construction give accuracy within 2% of full scale value. Folders are available with complete information on the new Sun unit for diesels and other applications. For catalogs and name of nearest distributor write to Sun Electric Corp., Tachometer Div., Harlem & Avondale Aves., Chicago 31, Ill.

Establishes Fellowship

Nelson C. Dezendorf, vice president of General Motors and general manager of Electro-Motive Division presented a check to John T. Rettaliata, president of Illinois Institute of Technology, to establish the R. M. Dilworth Fellowship for study of control of sound in diesel engines in honor of Richard M. Dilworth, former chief engineer of Electro-Motive. The presentation was made at a dinner recently at the Chicago Club attended by top railroad executives, educators and friends and former associates of Mr. Dilworth's, who gathered to pay recognition to Mr. Dilworth's long list of major contributions in the development of the diesel locomotive.

Speakers on the occasion of the Chicago Club dinner honoring Mr. Dilworth included H. L. Hamilton vice president of GM and founder of Electro-Motive in 1922; C. R. Osborn, vice president of GM, who was head of Electro-Motive through the middle and late forties; Charles F. Kettering, research consultant of GM who headed, in the thirties, development of the GM diesel engine around which Mr. Dilworth engineered the diesel locomotive; and Nelson C. Dezendorf, vice president of GM and general manager of EMD who presided and presented the fellowship.

Spacer Type Coupling



Operating and maintenance engineers will appreciate the practical design of the new Type F Steelflex Spacer coupling which makes it ideal for use between motors and pumps (where a gap between shafts must be provided to permit removal of pump impeller shaft assemblies) or on any application where a large gap (up to 12 in.) cannot be avoided. Over and above the protection which the Steelflex design offers against damage from impact loads and shaft misalignment, the Spacer coupling affords easy connection and disconnection of shafts without disassembling the coupling. Because this spacer coupling is prelubricated at the factory, maintenance lubrication requires only the addition of lubricant by means of a grease gun, once every 6 months. For further information, write: The Falk Corporation, Dept. 361, 3001 W. Canal St., Milwaukee 8, Wisconsin.

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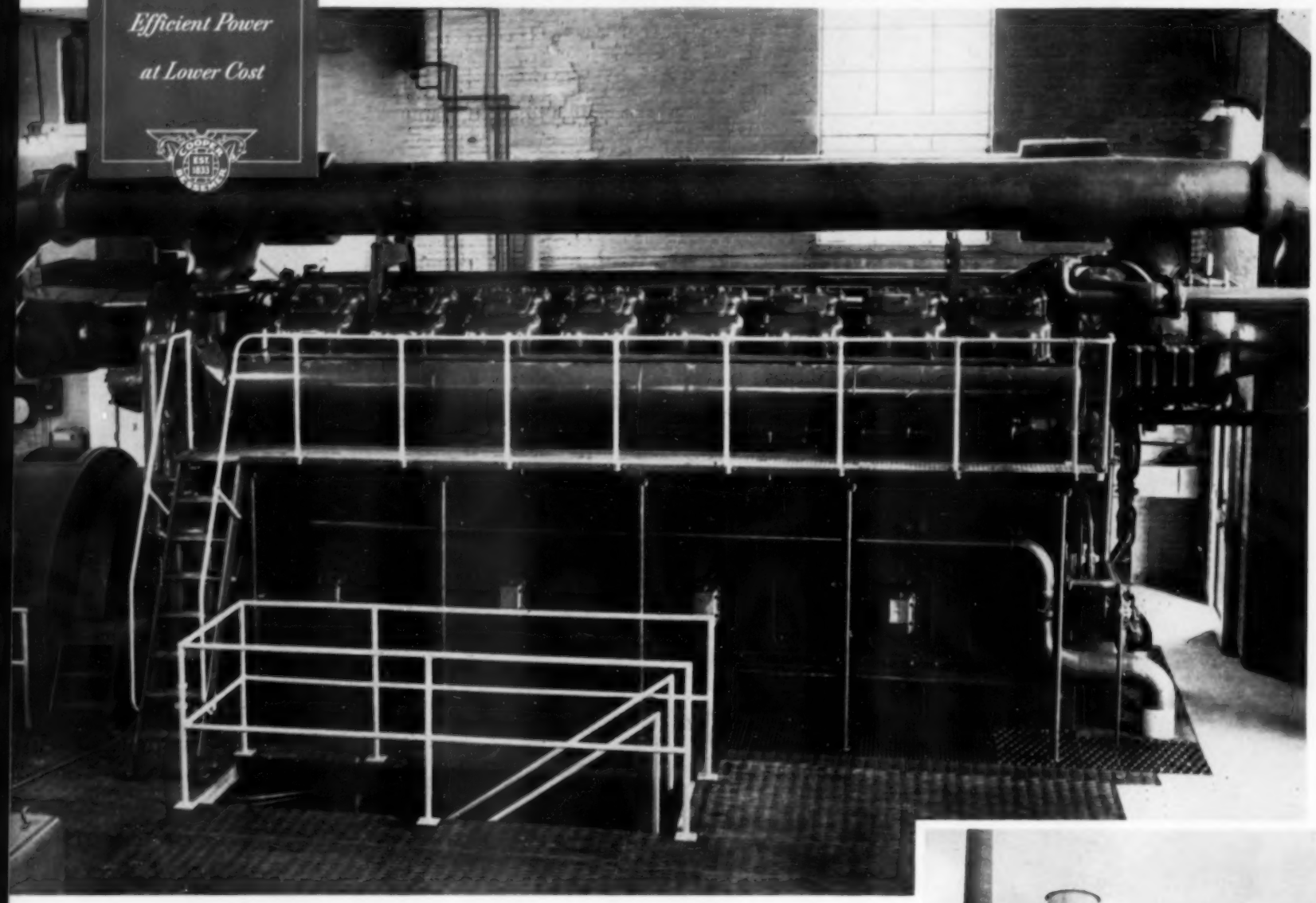

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